Vol. 133, No. 2 August, 1930 Price 25c

AMERICAN
GAS JOURNAL
Established 1859 Pioneer of the Gas Industry
Including GAS INDUSTRY Est. 1900

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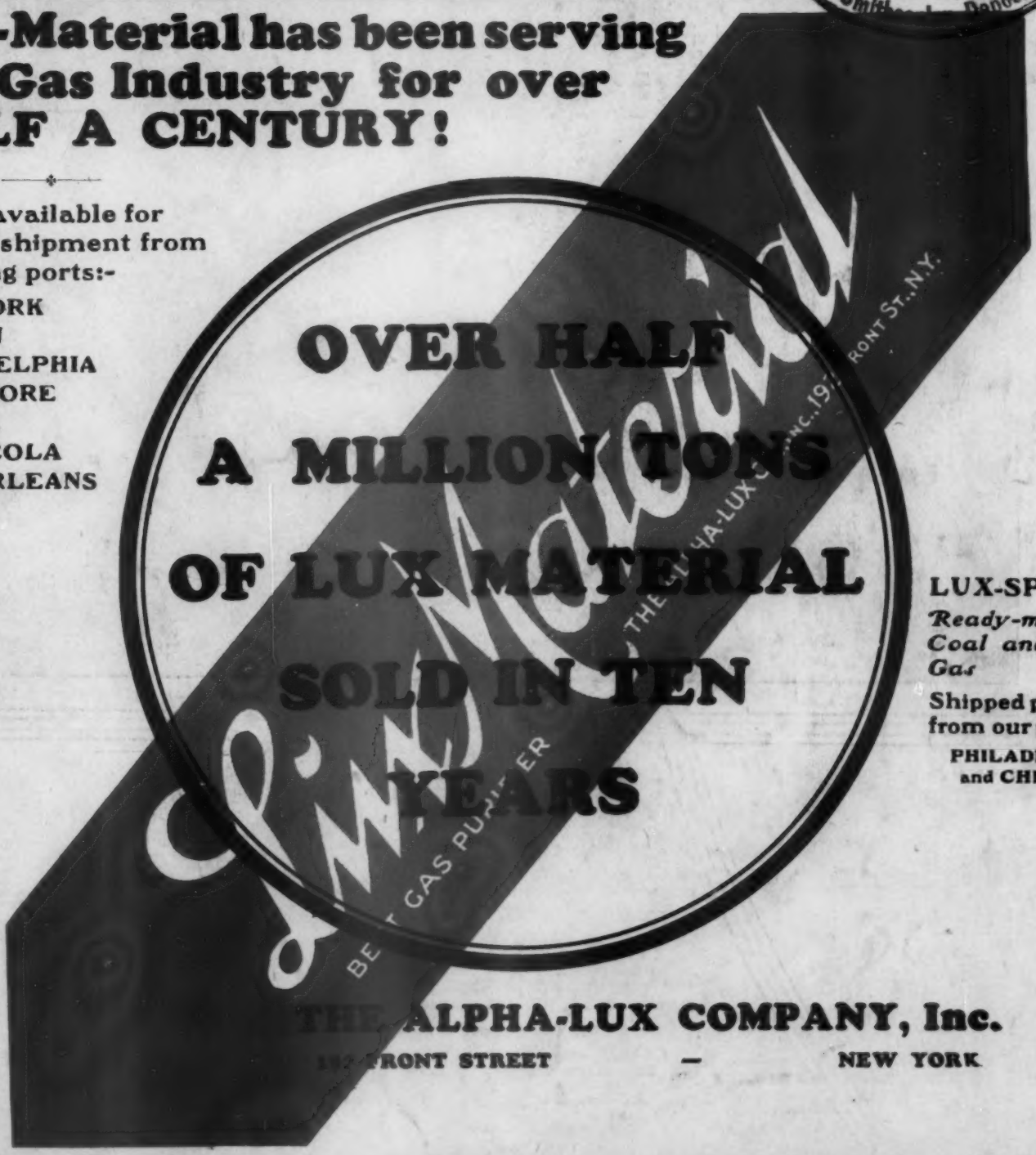

LUX-SPONGE
Ready-mixed for Coal and Water Gas
Shipped promptly from our plants in
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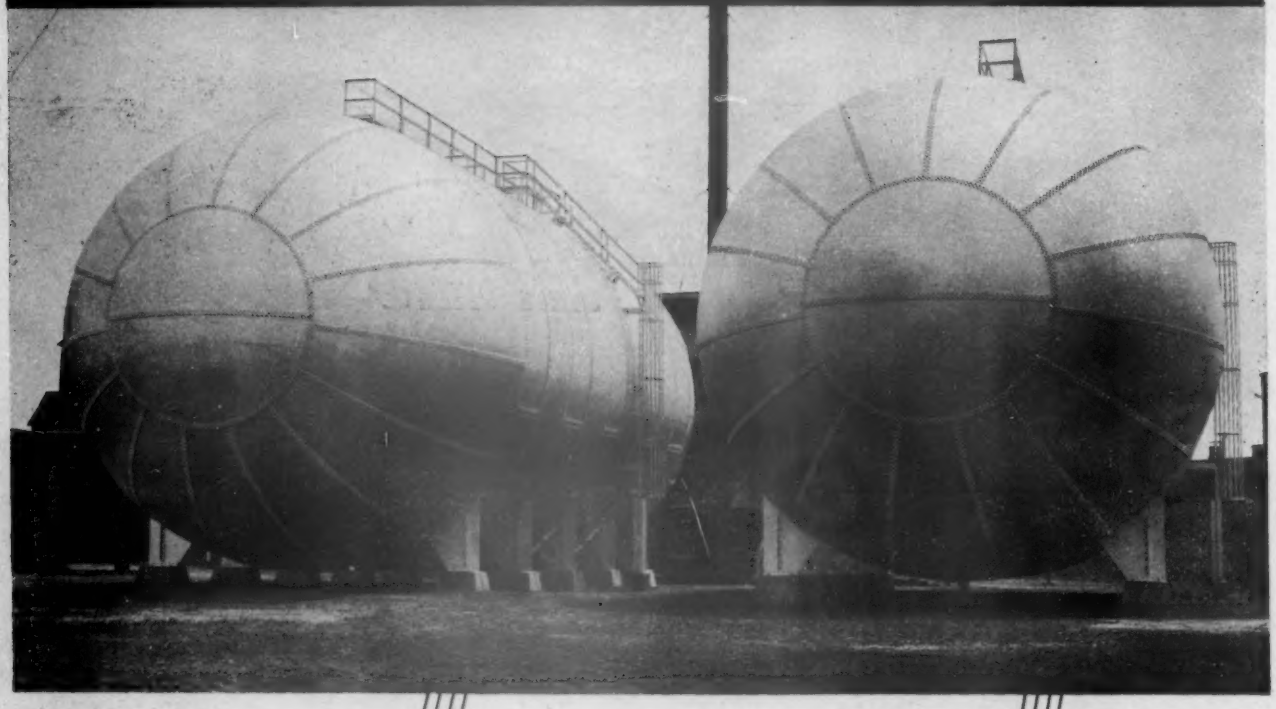
THE ALPHA-LUX COMPANY, Inc.
FRONT STREET — NEW YORK

Designed, fabricated & erected

"WESTERN GAS"



The Tanks illustrated were built for the Public Service Company of Northern Illinois, Chicago Heights, Ill.

They are 39' in diameter, 96' 7" overall in length, with a capacity of 300,000 cu. ft. between limits of 5 and 50 lbs. pressure.

Storage tanks of the type shown above successfully solve the question of high pressure terminal storage.

Our engineers will be prompt in conferring with, or advising, executives interested in this timely subject.

The Western Gas Construction Company
FORT WAYNE, IND. Subsidiary of THE KOPPERS CO.

Western Gas Designs and Builds

A. B. C. Generator Grates
Holders (Gas, Oxygen, etc.)
Naphthalene and Gum Absorbers

Condensing Apparatus
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Valves
Oil Foggers

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Established 1859 *Pioneer of the Gas Industry*
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Executive and Editorial Offices, 53 Park Place, New York City

S. G. KRAKE, *President and Treasurer* A. M. GLEASON, *Secretary*

H. M. RILEY, *Editor*

R. S. MCBRIDE, *Consulting Editor*, Washington, D. C.

Vol. 133, No. 2 August 1930 Whole Number 3680

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AMERICAN GAS JOURNAL, August, 1930, Vol. 133, No. 2 Published monthly by American Gas Journal, Inc., at 34 Crystal St., East Stroudsburg, Pa. Executive, Editorial, and Business offices at 53 Park Place, New York, N. Y. Entered as second-class matter, October 17, 1928 at the postoffice of East Stroudsburg, Pa., under the Act of March 3, 1879.

Subscriptions $2.00 per year, including postage in the United States, Mexico, Cuba, Porto Rico, Hawaii or the Philippines; in Canada $3.00; foreign $4.00. Single copies 25 cents.

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Manufacturer of single and Telescopic Gasholders; Wrought-Iron Bridges, Girders, Joists and Stairways, Coke and Coal Wagons, Rakes, Screens, and other Gas-works tools, Slide and Cup Valves, Belts, Nuts, Chisels, Ladles, and other tools, Wrought-Iron Roofs, for Slate and Corrugated Iron, Gas Purifiers, Washers, Centre Seal Valves and other Gas apparatus, Boiler-plate Retort Lids. Refer to—
Cincinnati Gas-Light & Coke Co.
Nashville Gas-Light Co.
Springfield Gas-Light Co.
Columbus Gas-Light Co.
Cleveland Gas-Light Co.
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GEO. STACEY & CO.,
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AND ALL KINDS OF
Cast and Wrought Iron Work
Used in the Erection of Gas and Coal Oil Works.
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MANUFACTURERS OF
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Water & Oil Tanks, Coal Elevator Cars, Coke Crushers
BENCH CASTINGS.
And all kinds of Wrought and Cast Iron Work used in the erection of Coal and Oil Gas Works. Rolling Mill Machinery and Heavy Castings a Specialty.
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Single, Double and Triple-Lift
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Of any Capacity, with or without Wrought Iron or Steel Tanks.
Hydraulic Mains, Condensers, Scrubbers, Purifiers, Valves, etc.
Coal Gas Benches, Roof Frames,
OIL STORAGE TANKS.
Pressed Steel Mouthpiece Lids, Self-Sealing Mouthpiece Lids.
Cincinnati, Ohio.

The five advertisements shown above were taken from issues of the American Gas Journal of the years noted thereon.

In 1850, George Stacey and Henry Ranshaw formed a partnership in Cincinnati, Ohio, under the name of George Stacey and Company, for the designing, fabricating and building of Gas Holders, Gas Plant Equipment, Steel and Cast Iron Work.

In 1851, Wm. Stacey, Fred Stacey and Thos. H. Birch were admitted to partnership in this organization.

In 1874, after George Stacey's death, the organization was carried on by the remaining partners until 1881.

In 1881, the Stacey Manufacturing Company was incorporated with Henry Ranshaw, President and General Manager, Wm. Stacey, Vice-President, R. J. Tarvin, Secy. and Treas. and Thos. H. Birch, Assistant General Manager.

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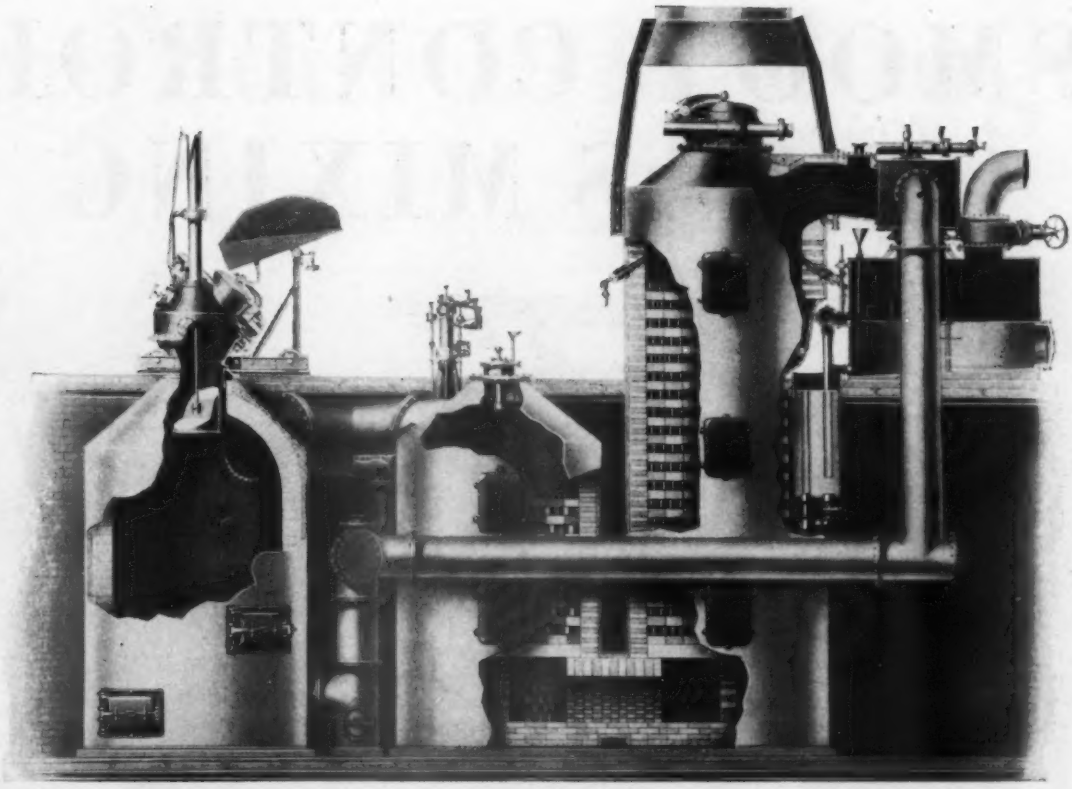
NEW YORK OFFICE:
52 Vanderbilt Avenue

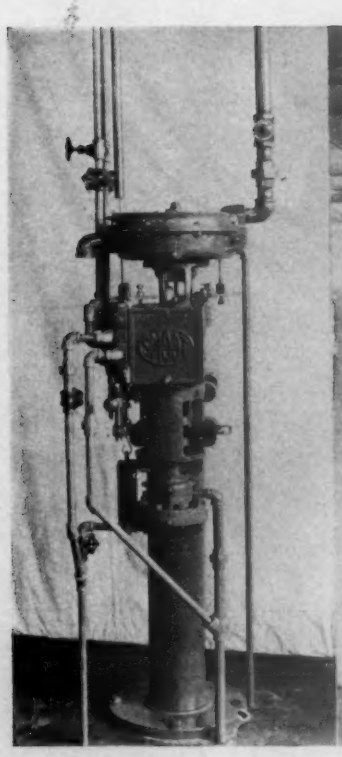
AN INDEPENDENT ORGANIZATION
NOT AFFILIATED WITH ANY OTHER BUILDERS OF GAS HOLDERS



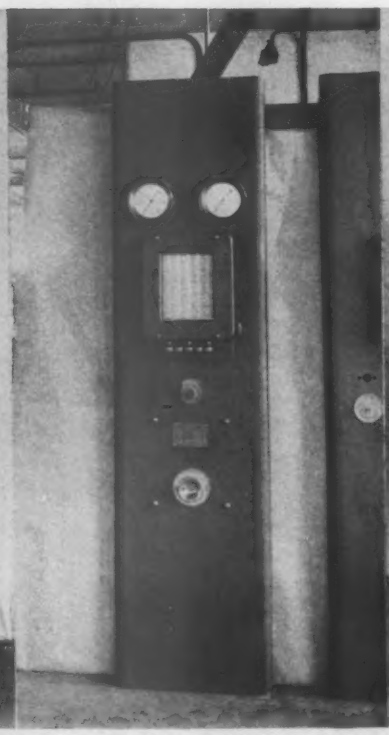
Perfection of engineering and construction detail of the Water Gas Machine with Backrun, as built by Semet-Solvay Engineering Corporation, continues it as the leader in its field.

SEMET-SOLVAY
ENGINEERING CORPORATION
Division Allied Chemical and Dye Corp.
40 RECTOR ST. NEW YORK

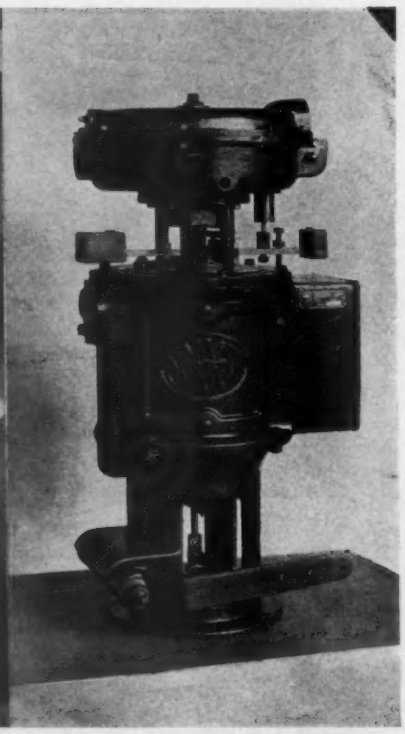
SMOOT CONTROL OF GAS MIXING



Smoot Piston Type Gas Mixer Regulator



Smoot Gas Mixer Ratio Panel
The operator may instantly change the amount of any of the gases in the mixture at this panel.



Smoot Gas Operated Gas Mixer Regulator

The following are the operating characteristics of Typical Smoot Gas Mixer Installations:—

Gas Mixer	Number of Installations	Gases Mixed	B.T.U.	B.T.U. Mixed Gas	Flow of Mixed Gas Cu.Ft. Per Hour
No. 1	4	Blast Furnace	90-110	180	1,250,000
		Coke Oven	550		
2	1	Blast Furnace	90-110	250	1,708,000
		Coke Oven	550		
3	2	Blast Furnace	90-110	200	1,000,000
		Coke Oven	550		
4	9	Blast Furnace	90-110	150-250	400,000-800,000
		Coke Oven	550		
5	1	Oil Gas	500	550	800,000
		Natural Gas	1,000		
6	1	Oil gas	450	500	260,000
		Coke Oven Gas	550		
7	3	Blue Gas	300	500	150,000-300,000
		Natural Gas	1,000		

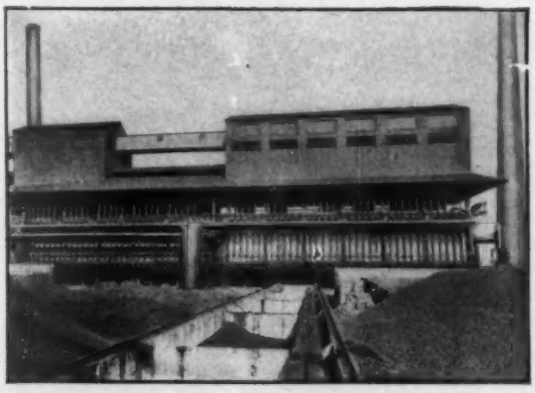
The Smoot Volumetric method of Gas Mixing is quick, stable and accurate and has no sampling or instrument lag in its correction for pressure or flow changes.

SMOOT ENGINEERING CORPORATION
136 Liberty Street **New York**

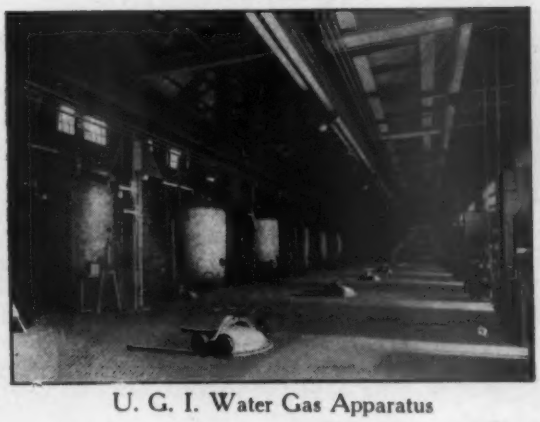
For Your 1931 Budget

reduce operating costs and increase capacity with U. G. I. apparatus and processes

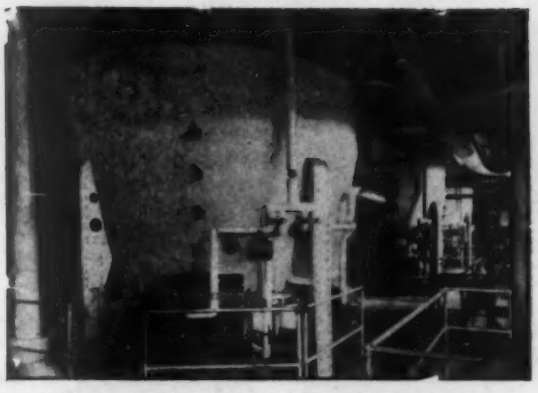
U. G. I. Reforming Process for Oil Refinery Gas



U. G. I. Vertical Chamber Oven and Gas Producer



U. G. I. Water Gas Apparatus



U. G. I. Mechanical Water Gas Generator

U. G. I. Heavy Oil Process
Automatic Control
Waste Heat Boiler

Pier Process
High Duty Condenser
Cyclonic Dust Catcher

THE U. G. I. CONTRACTING COMPANY
DIVISION OF
UNITED ENGINEERS & CONSTRUCTORS
INCORPORATED
DWIGHT P. ROBINSON, PRESIDENT

Philadelphia
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Chicago
Conway Building

MAXIMUM RETURN TO CLIENTS PER DOLLAR INVESTED

OXWELDING FOR PERMANENCE

A LEADING pipe line superintendent says: "We keep our welders busy all the time. When not putting in new lines, which are, of course, all welded, we are digging up old style lines and welding them. Our welded lines are the only ones that are permanently leak-proof."

Oxwelding has won the confidence of oil and gas line operators everywhere because, once tested, oxwelded lines need no further inspection. Oxwelded joints are stronger than the pipe itself.

THE LINDE AIR PRODUCTS COMPANY, THE PREST-O-LITE COMPANY, INC.
OXWELD ACETYLENE COMPANY, UNION CARBIDE SALES COMPANY,
Units of UNION CARBIDE AND CARBON CORPORATION
General Offices . . . . . New York UCC **Sales Offices . . . In the Principal Cities**
65 Linde plants . . . 48 Prest-O-Lite plants . . . 174 Oxygen Warehouse stocks . . . 156 Acetylene Warehouse stocks
42 Apparatus Warehouse stocks . . . 245 Union Carbide Warehouse stocks

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SATISFACTORY gas production at low cost is secured through efficient operation and well-conditioned equipment. And unless, and until these essentials prevail, your efforts to get anywhere close to 100% effectiveness from your plant are very slim.

A complete analysis of your plant, such as our organization is ably qualified to make, will disclose any weakness in the chain of operations or in the apparatus, and enable us to suggest recommendations for betterments of operating methods and equipment.

From our comprehensive knowledge of methods and principles which have been successfully established by us in hundreds of coal carbonizing plants during the past quarter century, plus a broad perspective of future trends in gas manufacture, we can place your plant on the sound workable basis necessary to cope with present conditions and future requirements.

We can be a help to you—Write us

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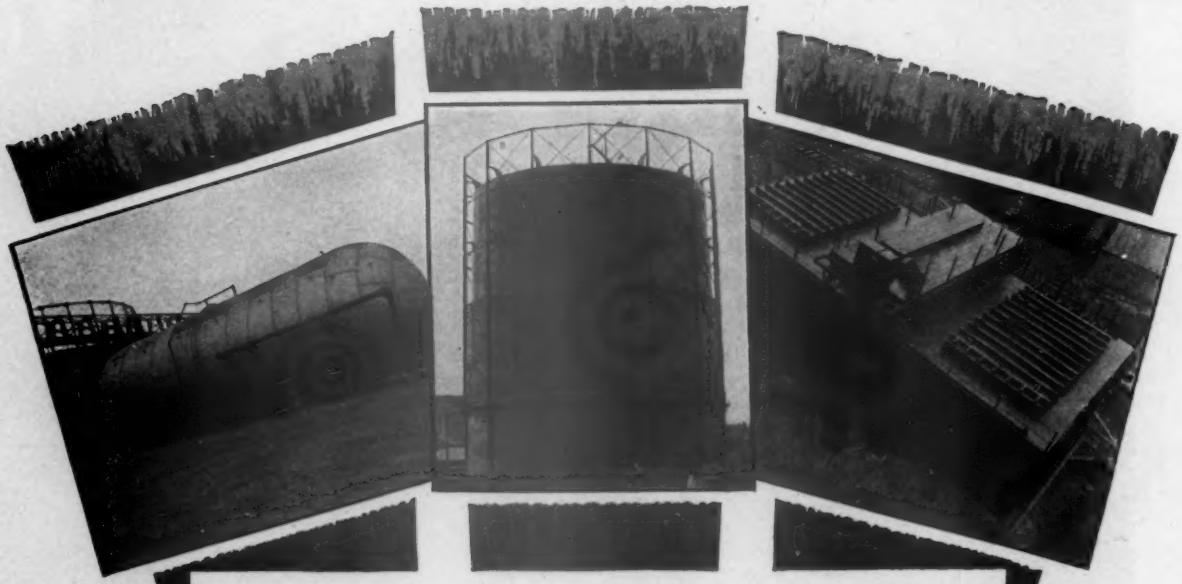
BRANCH OFFICE—205 W. WACKER DRIVE
ENGINEERING BLDG., CHICAGO, ILL.

IMPROVED EQUIPMENT-RUSSELL ENGINEERING CORPORATION

ENGINEERS *BUILDERS*

NEW YORK CHICAGO



MORE THAN 27 YEARS UNDER CONSTRUCTION

To have the Gas Industry recognize that Cruse-Kemper does a most excellent piece of work with every installation, is and has been the greatest undertaking of our organization.

You are well aware that our business can not rely for its growth—as many can—on the protection of patents or on the price advantages of mass production. *Only by building units that last, that perform up to and beyond expectations, has our reputation grown.*

We know that when we calk a Holder "every inch of the way" each pneumatic blow helps erect the great construction job we've spent our years to build.

CRUSE-KEMPER CO.

AMBLER, PA.

Manufacturers of GAS HOLDERS and other major equipment units for the GAS INDUSTRY

Pumping Gas Positively

One of three positive displacement pumps, each delivering 400,000 CFH under 10 lbs. pressure. Installation in Southern Ohio.

Means Efficiently!

You can depend upon:

A positive displacement of a measured quantity of gas for every revolution of the gas pump.

Reduction of losses common to other types, since rotary positive displacement does not require high velocities to produce desired pressure.

Further savings due to close clearances, no internal friction, large displacement per revolution, and power input that varies directly with the speed and pressure required.

For any gas or air pumping, boosting, exhausting or metering service, write

THE STACEY ENGINEERING CO.
[Blower Division]

Blower Division:
Meters
Gas Pumps
Blowers
"Cycloidal" Pumps
Vacuum Pumps
Liquid Pumps

Holder Division:
Gas Holders
"Stacey Bullets"
Purifiers
Scrubbers
Tanks
Penstocks

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CONNERSVILLE
WILBRAHAM-GREEN

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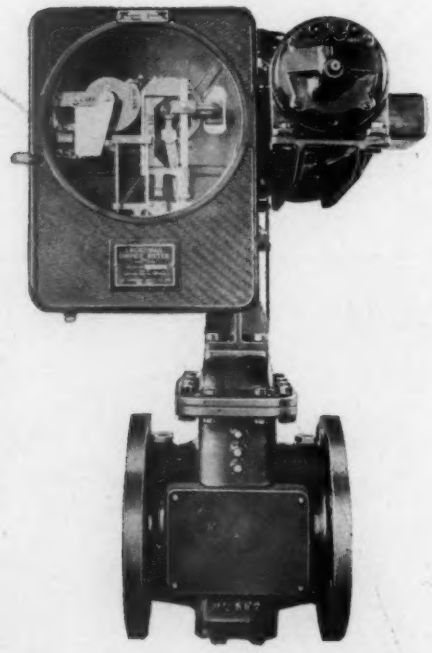
Chicago, Illinois

12th St. and Columbia Avenue,
CONNERSVILLE, INDIANA

420 Lexington Avenue
New York City



ZERO
TO
CAPACITY
Under Varying Conditions

MEASURED AND RECORDED ACCURATELY AND ECONOMICALLY WITHOUT A SINGLE CALCULATION

WITH precision and economy, the Linderman Orifice Meter measures all quantities of gas, from zero to capacity. Complicated calculations are eliminated by automatic compensation for variations in temperature, pressure, rate of flow, and specific gravity.

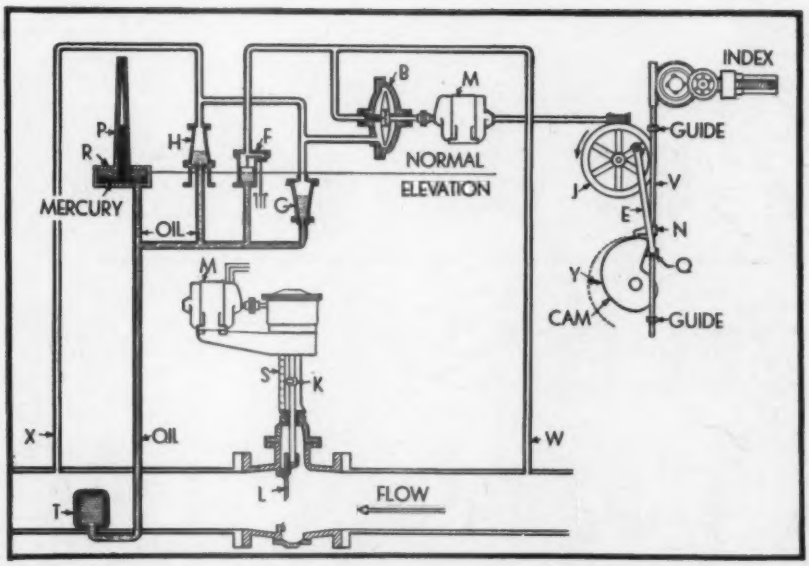
The gas measured is registered on a straight reading index. In addition, an easily read, permanent record of flow is indicated on daily or weekly charts. As a result, peak and off load reports are always at hand to aid in analyses of consumption and distribution.

The Linderman Orifice Meter is only about twice the size of a gate valve of the same capacity. With the exception of its controller, the meter is assembled as a single unit. Its compact construction insures operating efficiency in a minimum space.

A completely equipped experimental and inspection laboratory is maintained at the Metric Metal Works factory of American Meter Company. Here and in the field, engineers constantly study the most practical methods of gas measurement.

Four years of laboratory and field research preceded the introduction of the Linderman Orifice Meter. Many experimental models were observed and checked under various actual operating conditions before the present style was perfected and placed on the market. This has resulted in a highly developed instrument of unusual accuracy.

For gas companies and manufacturing plants, the Linderman Orifice Meter has solved many problems.



The Linderman Orifice Meter Compensates Automatically

See Description Below

Information regarding any phase of large volume gas measurement will be furnished upon request. The construction and operation of the Linderman Orifice Meter is described in detail by catalog LG-1, recently issued. Write for it.

The Linderman Orifice Meter Compensates Automatically

Automatic compensation is effected in this manner. The valve L—actuated by the difference in elevation of the surfaces of low volatility oil in cups H and F—maintains a normal differential. Mercury in the tube P compensates pressure changes. Blower B compensates variations in specific gravity. Oil in chamber T compensates temperature changes. Cam Y and blower B compensate for possible variations in the speed of motor M. These actions are fully explained in catalog LG-1.

Sizes and *Capacities

Pipe Size	High Pressure More than 15 lbs.	Low Pressure Less than 15 lbs.
6"	0 to 150,000	0 to 45,000
8"	0 to 290,000	0 to 90,000
12"	0 to 640,000	0 to 200,000
16"	0 to 1,250,000	0 to 350,000
22"	0 to 3,000,000	0 to 800,000
30"	0 to 4,000,000	0 to 1,250,000

*The above capacities are in standard cubic feet per hour.

AMERICAN METER COMPANY
INCORPORATED
The World's Largest Manufacturers of Gas Meters and Allied Apparatus
ESTABLISHED 1836
GENERAL OFFICES : 105 W. 40TH STREET · NEW YORK, N.Y.

AMERICAN METER CO. MEASUREMENT ENGINEERS CUBIC FEET

SALES · ERIE · DALLAS · TULSA · DENVER · LOS ANGELES · SAN FRANCISCO · KANSAS CITY
SERVICE · PITTSBURGH · CHICAGO · PHILADELPHIA · NEW YORK · BALTIMORE · BOSTON · ALBANY

3/4 of an inch for greater STRENGTH

HERE'S something you can't afford to overlook! These Mueller iron body stops have "recess" ends that extend nearly three-quarters of an inch beyond the threads. You can easily see how much more protection this provides the threads—how much additional strength at this vital spot.

You'll find all characteristic Mueller features in these stops—iron body and red brass key—inlet and outlet threaded at same time, permitting straight line connections "hot process" galvanizing for underground protection. Made in sizes ¾" to 2" inclusive.

MUELLER
G-11094 Recess End Gas Stop

Mueller gas stops are made in sizes and styles to suit every requirement. Your request will bring complete information or we will gladly make recommendations for specific installations.

MUELLER CO. (Established 1857), Decatur, Illinois; *Branches:* New York, Dallas, Atlanta, San Francisco, Los Angeles, Chicago; *Canadian Factory:* MUELLER, Limited, Sarnia.

MUELLER

A Mechanical Grate
For Water Gas Generators

May also be applied to *existing generators without radical changes.*

Operated by hydraulic cylinders and does not require other motive power.

Simple in design and rugged in construction.

Low initial and maintenance cost.

No parts to oil or grease.

Lowest operating costs.

Does not require expert supervision.

RESULTS IN:

Even and uniform removal of ash;

Uniform and constant condition of fire;

Practical Elimination of clinker;

Barring down and clinkering time eliminated;

Minimum labor costs;

Highest efficiencies of fuel and oil;

Increased capacity;

Savings in generator linings.

We will be pleased to explain this grate.

THE GAS MACHINERY COMPANY

1900 EUCLID AVENUE CLEVELAND, OHIO

(Shops at Collinwood Station, Cleveland)

Keeping Accurate Fuel Costs and Flow Records

Every business man today realizes that the most modern accounting equipment is a sound investment for his business.

It is just as good business to provide steam producing and steam using departments with modern accounting equipment, too, flow meters that record *pounds of steam* from the boiler—to the engine —to the heating system—to the process unit—during any period.

Only one flow meter—the Brown Electric Flow Meter with the Automatic Planimeter can do this.

The illustration at the right shows the margin of a Brown flow chart carrying the planimeter record. With every volume unit of flow the pen arm adds one of those little jogs to the record line. To determine the flow, simply count the jogs. Just as the accountant's fingers on the calculating machine check off your office cost data, so does this little pen arm unerringly check off data essential to cost of steam — processing — power — heat.

Write for information.

THE BROWN INSTRUMENT COMPANY
4473 Wayne Ave., Philadelphia, Pa.
Branches in 20 principal cities
"To measure is to economize"

Brown Electric Flow Meter

on the Inductance Bridge Principle

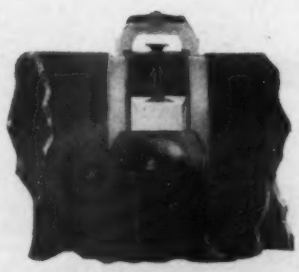
"For every joint on every line"

Less labor—less skill —less time—less cost . . . No joint repair or maintenance costs . . . Leak-proof joints for the life of the pipe . . . No line-buckling or pulling apart . . . When you use Victaulic Couplings.

• • •

Available for steel, wrought iron, cast iron and spiral weld pipe—all sizes from ¾" up—for all working pressures. See Sweet's Page 451. Mail the coupon below.

VICTAULIC COMPANY OF AMERICA
26 Broadway New York



"For every joint on every line"

FLEXIBLE LEAK-PROOF

VICTAULIC

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PIPE COUPLINGS

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Canada
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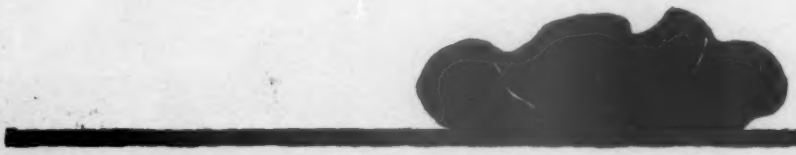

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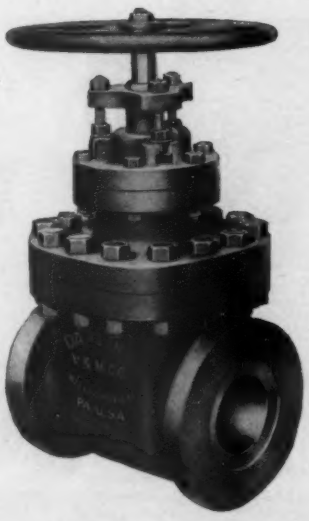

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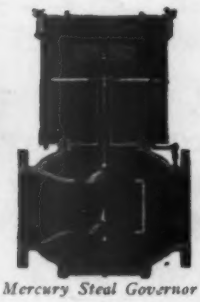

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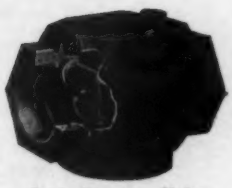

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BUTANE-AIR CARBURETION PLANT OF NORTHERN INDIANA POWER CO.
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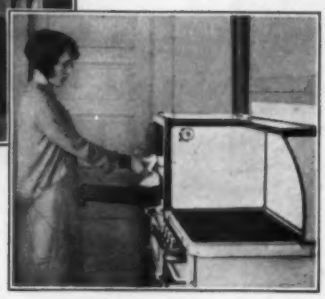

Butane with Philfuels Process opens new fields for distribution of gas « « «

The plant at North Manchester, Indiana, is one of five, operating or under construction, under the management of the Midland United Corporation or the Middle West Utilities, Insull holding companies.

There are now twenty Philfuels Process plants in operation, an increase of 300% since January 1, 1930. Sixteen additional plants are under construction in 9 different states.

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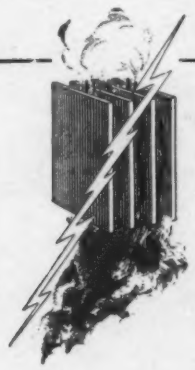

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The following applications of the Cottrell Processes are established by satisfactory performance and the removals effected being only dependent on the Purchasers' requirements.

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Our experience gained through the construction and successful operation of Cottrell Electrical Precipitation Process Installations of a total gas capacity exceeding 10,000,000 cubic feet per minute treating different types of gases enables us to intelligently study any new problem in gas cleaning. If our Process can be adapted, we are prepared to offer a complete installation guaranteed to effect the desired result.

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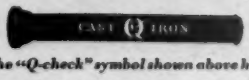
PORTLAND, MAINE, can testify to the economy of large diameter CAST IRON PIPE



The "Q-check" symbol shown above has been adopted as the trade mark of The Cast Iron Pipe Research Association.

NEARLY a score of years ago, Portland, Maine, built a complete new water supply system. The chief supply line consisted of a cast iron conduit 42 inches in diameter and 17 miles long.

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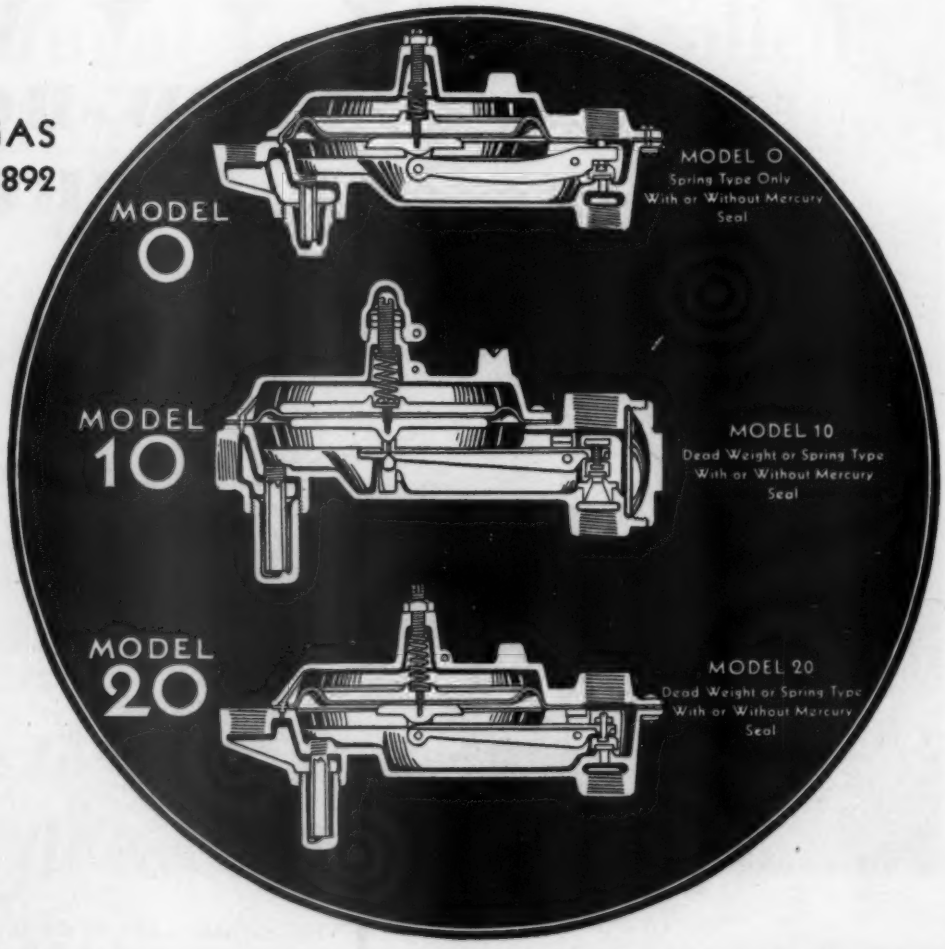
The reason for the durability which results in the economy of cast iron pipe is its resistance to rust and corrosion. Water and gas mains of ferrous metal (iron and steel) with the exception of cast iron, disintegrate from rust. Cast iron pipe is the only ferrous metal pipe practicable for underground mains that rust will not destroy.

For information regarding cast iron pipe for water, gas, culverts, sewerage or industrial needs write to Thomas F. Wolfe, Research Engineer, 309 People's Gas Building, Chicago, Illinois.

Cast iron pipe bearing the "Q-check" trade mark is obtainable from the following leading pipe founders: Alabama Pipe Company, Anniston, Ala.; American Cast Iron Pipe Company, Birmingham, Ala.; James B. Clow & Sons, 219 N. Talman Avenue, Chicago, Ill.; Donaldson Iron Company, Emaus, Pa.; Glamorgan Pipe and Foundry Company, Lynchburg, Va.; Lynchburg Foundry Company, Lynchburg, Va.; National Cast Iron Pipe Company, Birmingham, Ala.; United States Pipe and Foundry Company, Burlington, N. J.; Warren Foundry and Pipe Company, 11 Broadway, New York.

CAST IRON PIPE

RECOGNIZED GAS CONTROL SINCE 1892



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for all kinds of Pressure Reductions » » for either artificial or natural gas.

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- High Pressure Service
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VALVE » »
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MODEL O—the old standard has served successfully for a quarter of a century.

MODEL 10—All working parts so accessible as to be interchangeable without removal from pipe line. This permits efficient and accurate servicing for those who find it either convenient or necessary to employ this policy.

MODEL 20—This type is primarily designed for those companies who find it more convenient to service their units in their shops. All working parts are so accurate as to permit complete interchangeability in the shop.

The lever on both Model 10 and Model 20 is of parkerized steel which prevents corrosion, also a smaller lever-bearing service increases sensitivity.

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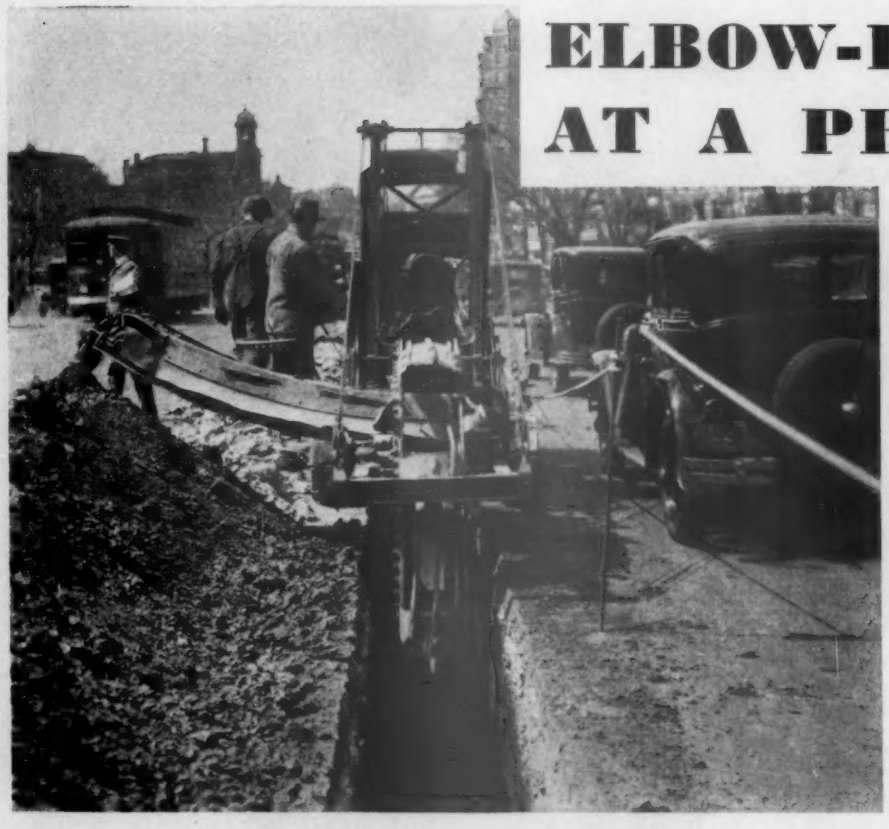

THE extreme width of the Baby Digger is only 58 inches, gross weight less than four tons, extreme height 8 feet, 2 inches. From these specifications, it is easy to see why the Baby Digger is the logical machine for digging gas trench, and to understand why its special design enables it to meet all your requirements for this class of work.

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Add to these features its advanced design, abundant power, unsurpassed ruggedness and you will further appreciate why Cleveland Baby Diggers are delivering maximum performance in the toughest and hardest soils —doing more work for less money.

You will profit by using the Baby Digger. Write today for our catalog No. 10 giving full specifications and details.

THE CLEVELAND TRENCHER COMPANY

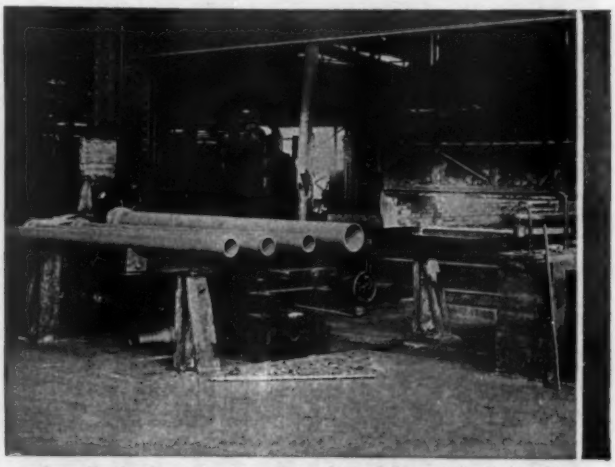
"Pioneers of the Small Trencher"

20100 St. Clair Ave. **Cleveland, Ohio**

The CLEVELAND BABY DIGGER

centrifugal casting } and { controlled annealing..

As soon as the pipe is formed in the mold, the bell is secured by a locking device and the deLavaud machine moves slowly backward.



Immediately after coming from the machines, deLavaud pipe is placed in a furnace where accurately controlled heat uniformly anneals every length.

combine to give strength and flexibility to deLavaud pipe

THERE are two fundamental reasons for the strength and flexibility of deLavaud pipe metal. The first reason is the centrifugal method of casting in the water-jacketed deLavaud machine.

In this machine, the iron is cast under a pressure which drives out impurities with a force many times greater than gravity. This pressure brings about an unusually dense metal structure.

The cooling action of the water jacket also contributes to the strength of deLavaud pipe metal by breaking down and evenly distributing the non-ferrous particles.

The second reason for the strength and flexibility of deLavaud pipe is the controlled annealing process. Every length of deLavaud pipe is placed in an especially designed furnace, as shown at the upper right. Here, accurately controlled temperatures anneal every length from end to end, eliminating casting strains.

deLavaud pipe is made by modern methods to meet modern demands. Being light in weight, it is easy to handle. Easy to cut and tap. And, it offers at least 5% greater carrying capacity for the same outside diameter.

deLavaud pipe is manufactured in strict accordance with the specifications of the American Water Works Association and the American Gas Association as well as in the thicknesses and weights of the United States Government Specifications. The new deLavaud Handbook gives complete information. Write for your free copy today.

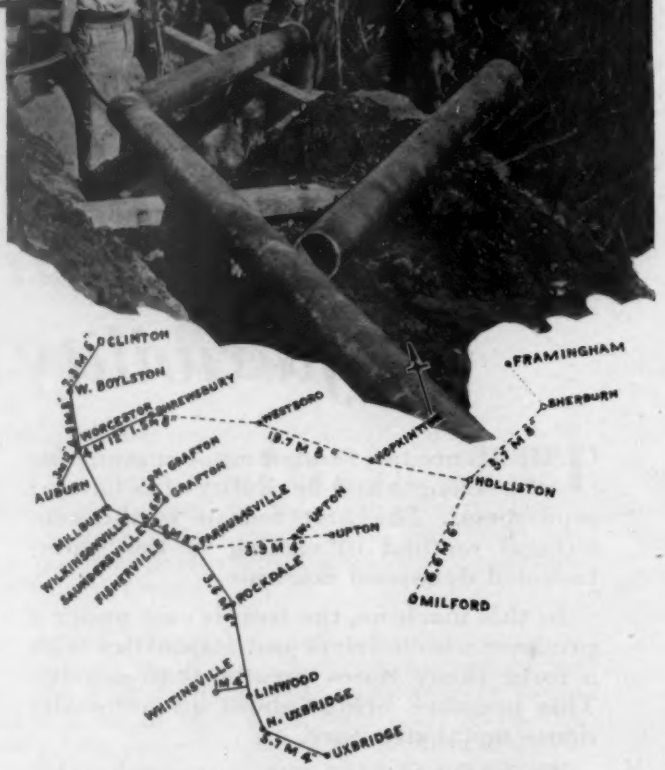
United States Pipe and Foundry Co., Burlington, N.J.

Our pipe bears the "Q-Check" trademark of The Cast Iron Pipe Research Association

Sales Offices: New York, Philadelphia, Pittsburgh, Cleveland, Buffalo, Chicago, Dallas, Birmingham, Kansas City, Minneapolis, Seattle, San Francisco, Los Angeles

The Worcester Distribution System . . .

109 MILES of National Pipe serve Worcester and adjacent communities



IN 1926 the Worcester Gas Light Company of Worcester, Massachusetts, inaugurated a program of extensions to their distribution mains. Their first and most important consideration was reliable service to the public. The chief factor in maintaining a reliable and continuous service is an efficient, durable piping system.

The selection of NATIONAL Pipe for the first extension proved so thoroughly satisfactory that for each successive extension every year up to the present time the use of NATIONAL has been repeated. 109 miles are now in operation, with an additional extension under way. Worcester's experience is typical of that of many other gas companies who have learned the real value of standardizing on NATIONAL—

America's Standard Wrought Pipe

NATIONAL TUBE COMPANY, PITTSBURGH, PA.
Subsidiary of United States Steel Corporation

NATIONAL PIPE

On the SOUTH'S LONGEST

PIPE LINE
From Louisiana to Atlanta —more than 450 miles of Dresser Couplings! Another great project speeded up! Another natural gas line that will remain permanently tight, flexible, free from maintenance.
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Complete Coal Gas Plants

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Fast's Flexible Couplings

GAS HOLDERS

THE BARTLETT HAYWARD COMPANY'S MAIN PLANT

AMERICAN
GAS JOURNAL
Established 1859 Pioneer of the Gas Industry
Including GAS INDUSTRY Est. 1900.

HENRY M. RILEY, *Editor*

What Is The Answer?

A CASUAL STUDY of the American Gas Association *Monthly Summary of Gas Company Statistics* for the Month of May, 1930, reveals some extremely interesting figures. For example; the domestic consumption of Natural Gas shows a decrease of 9 percent and an increase of 2.5 percent in customers when compared with May, 1929. Incidentally, these figures are based on 70 percent of the total consumption of Natural Gas for the entire country.

Turning to Manufactured Gas, we note the following data. In New England the domestic customers increased 0.6 percent, whereas the domestic consumption increased 4.8 percent; for the East North Central states the customers increased 2.3 percent and consumption increased 0.3 percent; for the state of Illinois the customers increased 2.0 percent, while the consumption decreased 2 percent; in the cases of Wisconsin, Indiana and Michigan the respective figures obtain, —increase in domestic customers, 3.7, 1.6 and 2.7 percent; increase in consumption, 7.8, 1.8 and 0.7 percent.

In general then, New England and Wisconsin show healthy increases, Indiana about held its own, Michigan and the East North Central states fell off considerably and the Natural Gas section and Illinois dipped into the minus column.

What is the answer to these altogether peculiar and varying figures? If the number of customers increases one would naturally expect the consumption to increase in the same ratio at least. Otherwise, the per meter consumption would be off. At all events, let us assume some other form of fuel has entered upon the scene and speculate from that standpoint. With the present status of business one would hardly look for any great number of housewives to dispense with their gas range and other domestic appliances and substitute some appliance using a competitive fuel. In any case they must still be retaining their gas appliances because perforce the increase in the number of customers adequately substantiates this claim. Further, it is probably safe to assert that not as many people are eating their meals away from home as a year ago, for the simple reason that they can cook and eat more cheaply at home and this keys in with the present business situation. All in all then, it would seem that the appliances at present on the customers' premises, for certain sections of the country, are being used less than a year ago. Further, it is somewhat evident that the two sections, New England and Wisconsin enjoyed a consumption that out-ran their increase in customers. Regardless of what the answer might be to the above varying figures, it behooves all interested in increasing per meter consumption to study their particular problems. A study of what New England and Wisconsin have done might also be in order.

Let the Press Pick Your Contact Man

THE TECHNICAL and general press heartily desire a contact with important utility companies. It is not strange, therefore, that the Public Utilities Advertising Association recently listened with much interest to the recommendation of the financial editor of the Public Ledger, Philadelphia, regarding the establishment of closer relations and better understanding. Mr. Connor rightly urges that utility companies cooperate with the daily and the specialized press by having competent contact men furnish all proper information promptly.

Mr. Connor did not recommend that the newspapers be allowed to select their own contact man. However, he might well have done so. All too often the man picked by the utility is one who by temperament and experience is unable, even though thoroughly willing, to give that cooperation which the press desires. No matter how well intentioned, such a man without a keen "news sense" is often helpless in securing sympathetic understanding, both between his company and the press and his company and the public.

It will be well if utility managements will encourage calls from members of the press at the offices of the company. It will be well to allow the newspaper man as free access to as many different officers as is possible. Before long the wise president or general manager will discover which officer it is that the newspaper men like best to see. It is probable that such an officer will be one not only with the news sense but also with that balance and good judgment which will enable him to deal competently with these outside inquirers. Thus the press will pick its own contact man to the mutual advantage of company and newspaper. The results will be more than advantageous to the utility. The scheme has much to commend it.

"Area Gas Supply" a New British Undertaking

IN JANUARY, 1929, there was appointed a British organization known as "The Area Gas Supply Committee" which was to undertake a study of the possibilities of interconnected gas systems. This project, covering an area about Sheffield, includes a substantial number of towns and a considerable suburban area in which coke works are numerous. The conclusions recently published in Great Britain indicate the very great desirability of cooperation between numerous works and suggest many details by which the development can be successfully made.

In the British report it was pointed out that conditions of gas supply in Germany are quite dissimilar to those in Great Britain. And any American engineer studying this British report will quickly discover that American conditions are different still. Nevertheless, American industry can take directly from this report one important lesson, that of more intimate association between coke works and public-utility gas supply systems.

America has been very fortunate in its ability to utilize surplus gas from coke works. Such competition between coke producers and gas companies as has existed has been highly localized and not of serious import. Apparently the British have not been quite so fortunate as we.

In this particular project the British have gone somewhat farther than has ever been proposed for American systems. They are developing an interconnected network analogous to the American power systems which are physically connected for interchange of power even though of diverse ownership. We have not had in the United States as many cases of this sort as there might well have been. It is not difficult to imagine many circumstances in which works break-downs or pumping-system failures might make such connections of vital importance. It is, of course, not practicable to interconnect systems at great distances, but it should be practicable, and it is highly desirable, to have physical interconnection wherever two distribution systems are contiguous or approach closely to each other. Even though such pipe lines may be only rarely used, it will be an insurance against interruption of service in both systems that will amply justify some small expenditure for its construction and operating maintenance. Wherever such conditions exist in America advantage should be taken of this possibility.

Speaking of Competition

THE PRESENT ECONOMIC TREND in this country has as one of its prime objectives the elimination of manual labor and the widespread substitution of mechanical devices and methods in its stead. Indeed, along with this movement has also gone an effort to make the average American's environment more artistic and hence, more livable. In attaining these two ends it has been necessary, in many cases, to

increase the cost of the various commodities and other items entering into the everyday life of the community. As a consequence we have in the home today many appliances the interest on whose investment alone would pay for the equipment required to accomplish the particular task in the past. But, it would be stupid to state that the old way and the new way are competitive.

It is of interest to speculate on the future of gas and its competitors with the above ideas in mind. For use in the home and from a purely thermal basis gas has three competitors,—coal, oil, and electricity. Coal is gradually passing out of the picture, so to speak. Granted that it is generally economical to use, it must be admitted that it does not contribute much to the artistic and cultural advancement of a community. Indeed, in the case of soft coal, its use constitutes a distinct and ponderable detriment. Further, coal must be conveyed or carted from some central point in a town to the various places of use. This cartage and handling involve the expenditure of muscular labor. And, people are willing to pay for the elimination of such.

Business is largely a state of mind

Oil, from the standpoint of househeating, is a distinct improvement over coal. It has the disadvantage over coal, however, in that it must be transported to the home. This involves the possibility of a lack of fuel supply in the home due to a blizzard or other untoward conditions. Further, oil does not possess the complete combustion properties of gas.

It would seem that electricity is the form of thermal energy that might be very energetically pushed, particularly for cooking, in the near future. It is the only form of heat outside of gas that is brought to the home without the expedient of cartage. This, of course, is decidedly in its favor and lifts it from the class of coal and oil.

From the angle of being artistic in its application electricity, despite much harping to the contrary, must occupy a back seat when compared with gas. A gas range is practically just as easy to connect in the kitchen and looks just as well when in site as the electric unit. Then, coming to the case of portable cooking units, such as the coffee percolator, toaster, etc., a field in which gas does not make much effort, we fail to see much of beauty in a length of electric wiring dangling across an otherwise nice appearing dining room table. And, the usual method of getting electricity into the home via the pole and exposed wire route is a crude and ugly arrangement, to say the least. A fine looking suburban home steps back a notch or so, immediately upon its being hitched to a chestnut pole by means of a wire as it describes its ugly catenary across a span of fifty or so feet.

From nearly every angle — cost, ease and beauty or application, dependability — gas would seem to easily outstrip its competitors, so-called. Only gross stupidity and allowing itself to be tricked by catch phrases will cause its now increasing application and popularity to wane.

Threatened Competition for Water Heating

CERTAIN public utility companies which have subsidiaries in the steam business have been giving serious thought recently to developing small steam-distribution units in residential areas where they deem it feasible to reach a reasonable number of apartment houses, private residences, stores, etc. One of the possibilities being considered in this connection is the securing of summer water-heating business on such steam lines. The theory is that where steam utilizations can be justified for a six or eight-month heating load they may also be employed for the summer water-heating service at extremely low steam rates.

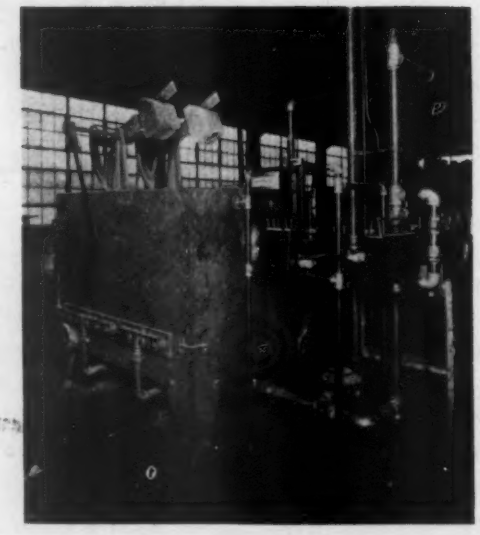
Gas men in territories where any utility steam service is being rendered will do well to look into this possibility. It may require favorable seasonal gas rates to offset the threatened competition. Such seasonal rates for water heating are, in fact, worthy of careful consideration even without this threat.

THE Annual Convention of the A. G. A. will soon be here. There will be many more exhibitors than last year and the program will be one of wide scope. Make your plans to attend this meeting at Atlantic City, week of October 13th. You will take home with you a fund of practical information.

GAS— The Ideal Fuel for Brass Finishing

Upper — Brass Annealing Furnace showing Method of Loading

Right — Automatic Temperature Control on Brass Annealing Furnace



Left Center — Unloading Coils of Brass from Annealing Furnace

Lower—Battery of Brass Annealing Furnaces in Finishing Plant

Annealing with Gas in a Brass Finishing Plant

S. P. RODGERS

Industrial Fuel Representative, Consolidated Gas Electric Light and Power Company of Baltimore

AS RECENTLY as the American Revolution when the American brass masters cast small quantities of the yellow metal called brass into cannon with which to help the fight for independence, very little was known of its manufacture except that a random fusion of copper and zinc resulted in brass.

A few decades later when our brass production was still negligible, pewter buttons were the style. Brass ones though were beginning to come in from England and catch the public eye. A group of Connecticut workmen determined to meet this competition. Their copper was salvafied from old stills, kettles, ship sheathing and the like and their zinc from scrap piles too. Thus was started America's brass industry, which today produces more than that of any other nation.

The Finishing Mill

Large mills now ship many tons of brass and copper each day in the form of bars and rolled stock to be used as raw material in a wide variety of products. In complement to these plants there has grown up a number of smaller companies who might be classed as finishing mills. Their raw material is the heavy gauge rolled stock which they purchase from the large refining and rolling companies and their finished product cover a wide field both in gauge and width of metal. It is they who supply the radio manufacturer, the auto radiator fabricator and the button maker with rolled brass and copper of just the right gauge, width and degree of softness which are best suited to their requirements.

Brass when hammered or worked cold becomes hard and brittle. Decades ago a brass worker found that brittle brass when subjected to heat became soft again, so that it could be re-worked.

Today this process of "softening" brass is known as annealing. Annealing then is the term applied to the heat operations whereby the material strains set up in the structure of the metal by rolling, forging and drawing are removed. This process is not unlike that employed for softening iron and steel except for the very important difference, namely, that brass can be cooled quickly from the annealing temperature without becoming hard.

Brass is usually either rolled or drawn and must be annealed between rollings and also after the final working, if soft metal is necessary to meet the specifications. In the large rolling mills the annealing in the breaking down operations has been accomplished by oil heated furnaces while chestnut wood from the New England hills was used for the finish anneal. Recently, however, a large continuous gas furnace has been installed to replace the wood in this finishing process. A bright anneal is not being obtained but the finish of the brass is superior to the product of the wood muffles.

To obtain an accurate and possibly helpful conception of how gas can be used to advantage let us consider the case of a local mill. This plant is a finishing mill for they do not do any refining and the metal is bought in rolls of varying widths but usually of the base price gauge. If it is received in an annealed condition it can be reduced to half the original thickness before heat treating is necessary. At this point it becomes too hard for further rolling and must again be made ductile by annealing. Then comes a second rolling by which in two passes through the rolls its thickness is again reduced by half. A second annealing follows before the final rolling. Then if specifications require soft metal there is the final anneal. Following this the coils of brass are unwound and passed through a weak solution of sulphuric acid and then hot water to remove the light coating of oxide to give the brightest finish.

A large part of the brass is sold in this thickness but frequently the customer may require .001" metal. This is tedious work for the metal must be reduced in thickness very slowly and annealed between each pass. By the time it has reached this less than paper thickness both care in handling and eveness of anneal are required to prevent either creasing or tearing.

A perfect anneal is thus essential both from the point of view of the foreman who is responsible for the rolling of the brass and the customer who must use it in his own manufacturing processes.

Oil Supplants Gas

This finishing mill has been in this business for some years and almost ten years ago was using gas satisfactorily in a double end underfired furnace some ten by fifteen feet in hearth dimensions. The rolls of brass were placed on large steel pans which were pulled in and out by a power winch. But with the end of the war came increasing gas rates and though they were loath to lose the advantage of the satin like finish which the gas anneal had produced, the furnace was converted to oil firing. They obtained an anneal which was passable, bare fuel costs were reduced and thus they ran along for a number of years. Repair costs, however, were high, oxidizing of the metal was excessive, the fire-edge which is the discoloration of the edges from overheating, was objectionable, oxidizing of the surface

was excessive, cleaning costs were higher and they undoubtedly missed the smooth pitless finish which they had become accustomed to having.

In the early part of 1928 they began to consider the possibility of once more using gas. An estimate of the oil cost was difficult to obtain for it was also being used for bright annealing copper in a Kenworthy furnace. But they did know that repair costs were averaging nearly fifty-dollars per month. This, plus a reasonable estimate of fuel costs, brought the total near enough to our estimated gas figures for them to feel justified in spending the difference to obtain a smooth even anneal and at the same time reduce oxidation and the amount of pickling required.

Objections to Electricity

At this time electricity as well as gas was considered in spite of the fact that the heating costs would undoubtedly be higher. For it seemed logical that if the cost of the finished product was the proper basis of comparison for gas and oil a careful analysis of what could be done with an electric furnace was also warranted. Upon investigation we were able to make it apparent that a gas furnace could be obtained which possessed all of the advantages of automatic temperature control, even heat distribution, cleanliness and comfortable working conditions which were credited to the electric furnace. Also, it seemed that the electric furnace would have one disadvantage not found in a fuel heated furnace. This objection was due to the grease and dirt which the brass picked up during the rolling operation. In the electric furnace this grease and dirt is not oxidized or burnt off as in the combustion furnace and tends to bake on the brass. This is a rather serious matter on the finishing anneal.

Since the time of the original gas installation an analysis of the plant's output of brass showed that the tonnage was not as high and that it varied from week to week. For this reason it was decided to install several small rather than one large furnace of equivalent hearth area.

Gas Supplants Oil

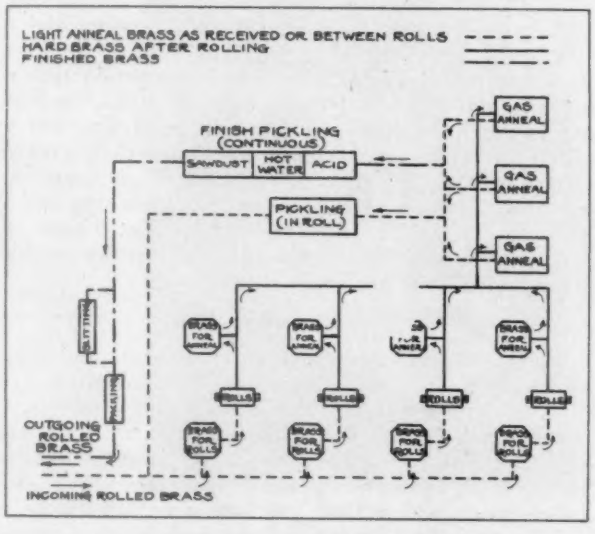
Only one furnace was ordered at first, as the management wanted to be certain of the gas fuel costs. It was an Eclipse oven furnace equipped with a low pressure proportional mixer supplying twenty burners which fired across the arch and under the hearth. The hearth was an alloy steel plate 24" x 48" resting on fire brick slabs and supports. A metal hearth was used for its wearing qualities as the rolls of brass loaded on steel pans were to be pushed into the furnace. The walls were of 4½ inch firebrick and 4½ inch sil-o-cel with two flues located in the back wall slightly above hearth level. Automatic temperature control was provided by a Brown instrument which operates on the air line of the low pressure proportional mixer.

From the very start it became apparent that, as might be expected, the character of furnace atmosphere was very important in obtaining a relatively bright finish. After some experimenting and by using an Orsat it was found that an atmosphere of 12.0% carbon dioxide and 0.8% carbon monoxide produced the desired smooth finish practially clean of oxide. As little as two percent of oxygen produced a scaly finish and two percent of carbon monoxide tended to cause a carbon deposit on the brass.

It also became evident that the gas consumption per pound of brass was considerably less than a conservative estimate had indicated. A typical week's run after the furnace had been in operation for about a month was as follows:

Date	Cu.Ft. Gas	Lbs. of Brass	Loads per Day	Ct.Ft.Gas per Lb.	Remarks
7/ 9/28	7600	7550	6	1.01	10 hr. day
7/10/28	6500	7450	6	.87	"
7/11/28	6200				
7/12/28	6800	8035	7	.85	"
7/13/28	7700	9300	7	.83	"
7/14/28	4500	5580	4	.81	½ day
Average	39,500	45,620	36	.86	

As the annealing furnace temperature is approximately 1000°F, varying with the analysis and gauge of rolled brass, the overall thermal efficiency is about 24 per cent.



Flow Diagram of Brass through Finishing Mill

After this first furnace had been in operation for eight months the company decided to install a second one. Experience suggested that it be somewhat wider, the burner capacity be reduced and additional flues be located in the front as well as the back wall. The greater width made loading easier and thus reduced the time for this operation; less burner capacity eliminated any trouble from temperature creeping when operating with light loads; and the front flues prevented air from being drawn in after the burners were turned off with the load still in the furnace. This is sometimes done with light loads or towards the end of the day in order to make use of the heat stored up in the walls.

Both furnaces are now in operation and are producing a uniformly annealed roll of brass which has an almost bright finish when removed from the furnace. Thus, only light pickling is required instead of the strong sulphuric and sometimes bi-chromate of soda solutions which had been used. The smoother surface is also a desirable feature but the uniformity of anneal is most important to the customers of the company.

What is the Best Method to use in Protecting Pipe Lines against Electrolysis and Corrosion ?

WILLIAM J. MISKELLA
Consulting Engineer on Finishes and Finishing Problems

Method of Coating with a "Granny Rag"

EVERY year millions of dollars are being spent in this country for new lines and additions to existing lines for the underground transportation of natural gas. Next to the actual pipe for handling this large supply of gas the maintenance question is paramount and certain basic facts which govern the matter must be considered before the last word may be said.

Just recently The American Petroleum Institute, in conjunction with the Bureau of Standards, conducted the preparation of some very elaborate test samples. I say "elaborate" because from one to three representatives of approximately forty-six different paint companies, from all parts of the United States, spent the better part of a week at Versailles, Penn., each endeavoring, in their own way, to contribute their bit to aid in the solution of the big question—"what is the best method to use in protecting pipe lines against electrolysis and corrosion?"

Each of the paint companies represented sent in samples of their best products for application to the standard pipe sections. These sections had been previously determined upon and prepared according to a very well defined plan which fundamentally started all off on the same basis. In other words, all the pipe was the same and all samples of it which were delivered to the various paint companies' representatives were sand-blasted. Accurate records of all operations were kept by disinterested observers and finally, before the samples were packed for shipment to the various sections around the country, to meet the varying soil and moisture conditions, they were all tested electrically to see that no weak spots existed. These samples are to remain in the ground for seven years after which time they are to be uncovered and a final report made on them.

But, practically speaking, pipe will never, never be sand-blasted. That means the preparation of the surface will always be an open question. However, the final report will be valuable in determining which of the coatings stand up the best and just what has to be done to meet certain soil conditions. Thus, the time and effort put into these carefully planned tests will not be without reward.

Now! in regard to the current practice in pipe mills in the preparation of pipe for the market! It is interesting to note some of the operations that are necessary in order to finally get the pipe to the job. Starting in the mill where the pipe is made it is the custom to hydrostatically test each individual length after the various pipe sizes have been threaded and cut to the proper length. Thus there is an opportunity for oil to become mixed with the water used in testing and this will leave a film on the outside surface of the pipe which must be removed if the ultimate finish which is applied is to actually protect against corrosion.

At the present time it is general practice in pipe mills to ignore this oil-water emulsion and proceed to apply the priming of pipe-coating oil or paint to the pipe without any attempt at cleaning the metal surface. This

means the adhesion of the priming oil will not be positive beyond all doubt. Let me say, in justice to some pipe manufacturing companies, that this question is being seriously considered and in a short time methods will be corrected to take care of it. However, the oil or soap, or whatever is used as a lubricating medium in the pipe manufacturing mill, must be eliminated before the protective coatings are applied, otherwise all the efforts to provide a positive protection that will reduce the hazards of corrosion will be of no avail.

A Pipe Improperly Coated

For the readers who may not know the general procedure it might be well to state that the present practice is to apply a thin protective coating to the pipe at the pipe mill. The object of this is to protect it from rust from the time of shipment until it is ready to receive the second or protective coat just prior to being laid in the ground. At that time great care is taken to see that the entire surface is covered and that there are no weak spots by means of which a start may be made toward corrosion.

The pipe manufacturer has never looked upon the priming coat as anything but a makeshift, whereby the pipe might be delivered in good condition. Immediately after the coating at the mill is applied a number of the pipes are bunched together and handled with log chains by means of an overhead crane which drops them into the freight car which is to carry them to their destination. Obviously, this operation has a tendency to mar and scratch the soft primer so that many breaks are made in the ultimate priming film.

The latest practice is to apply this primer coating automatically as the pipe is being passed through a continuous manufacturing process. In many instances an excess of coating material drains off from the pipe that is in process. This waste eventually reaches a storage sump. From time to time the material which collects in this sump is poured back into the original material container with the result that some of the scale and dirt which collects in it finally reaches the surface of a pipe which is subsequently primed—resulting in a defect which is sure to cause a separation between the pipe proper and the protective or second coat after it has been placed under the ground. Furthermore, this dirt also helps to clog the nozzles of the spray gun unit.

What Happens During Drying

Since the general type of oil used for this purpose is of the type which dries by oxidation it is to be expected that the exposure of the drained oil, to the air, is bound to create improper mixing conditions. This, of course, results in unnatural internal stresses within the priming film. Perhaps a word of explanation regarding this drying by oxidation might not be amiss.

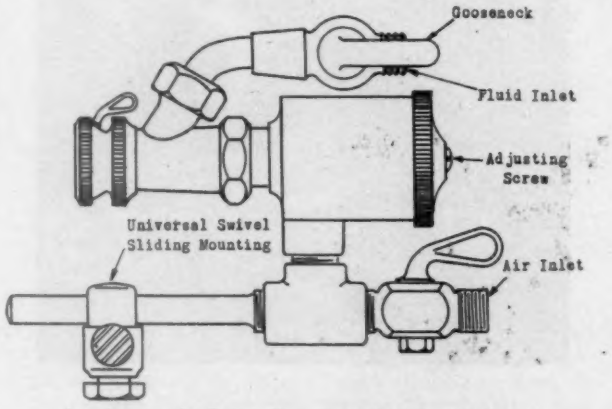
It is a common belief that coating materials of this type give up "something" in the drying process and proceed to dry or harden as this "something" is supposed to evaporate. As a matter of fact, this is not what happens at all. When a pipe-oil oxidizes or "hardens" it actually takes oxygen from the air which acts on it chemically. As this oxygen continues to react with the so-called drying oil in the priming film its weight is actually increased and not decreased, as one would be lead to expect.

The Facts in the Case

Many of the various pipe coating materials which are use in the field by the thousands of gallons are made chemically foreign to those used in the priming coat. This means there is no union between the two kinds of material—no more than there would be were the pipe coated with a sheet of paper. From these remarks the reader will readily see the entire question of pipe coating is not one in which the problems involved can be solved by giving attention to any particular coating material or any particular coating equipment.

It is purely a question of considering the entire process from beginning to end, and all the angles involved from the time the pipe is delivered to the testing department in the pipe mill until it is actually laid underground ready for service.

Some of the most recent engineering developments in this industry include means for continuously removing the oil and alkali from the pipe while it is in process in the mill. In this the conditions which have been confronted are very similar to those experienced by automobile manufacturers in the handling of fenders and similar parts going through the finishing process; the



An Automatic Spray-Gun for Applying Primer

marked difference being that the automobile parts are themselves carried to the cleaning and rinsing tanks, by means of conveyors, etc. There is one tank containing a hot alkali cleaning compound solution and another one containing hot rinsing water for the automobile parts. However, in the pipe mill it is not practical to dip the individual pipe lengths in a hot tank because of the great drop in the temperature of the solution which would result, due to the tonnage of metal that would have to be heated.

Therefore, the idea of working on a small section of the pipe as it progresses through the manufacturing process is the only practical way of adopting the chemical cleaning process to the lengths of pipe without act-

ually placing them within the various tanks. The continuous method is economical because the heat supplied to furnish the hot steam used in the cleaning operation is economically dispensed to the heat advantage and there is no heat loss that is not directly beneficial to the operation as a whole.

Adequate Equipment Necessary

Again, the industry is able to profit by the experience of others in similar situations. This is the age of automatic equipment and to-day I might say that almost all coating materials are applied with the use of the spray gun. The work is accomplished much quicker, is applied more evenly and is less tiresome to the workman. Industry is able to see the practical side of having sufficient automatically operated spray guns to take proper care of the job in hand. Formerly it was the custom to try to get by with as little initial equipment as possible but time and experience has proven this is not good practice, since there is a possibility of the machine, and even the entire department, having to be shut down in order to recondition the painting outfit for further performance.

Under the new order of things the finishing material is supplied, by pressure from a central storage tank, to the various pressure containers that are equipped with air motor driven agitators which keep the coating material in proper condition at all times, since they are operated continuously. By and with this new method there is no possibility of having to shut down, for each unit of the whole is filled or repaired individually—entirely independent of the whole—yet in perfect unison with the whole. It is just one continuous flow of material, evenly and uniformly applied to the work in operation.

Under the old system a maximum number of gun units were operated continuously regardless of the size of pipe, but the new designs provide for the operation only of one-third or two-thirds of the number of spray units—or, whatever number is best suited for the size of pipe that is being run. This means a saving in material and a reduction in the amount of material that is wasted and which is falsely supposed to be reclaimed and used over again—one of those false economy ideas in which the cure is more expensive than the entire loss to the waste material which is being saved.

It is an easy matter to see horrible examples of improper coating. Wherever one finds drips, curtains and chunks adhering to the surface of the finished pipe he may know something is wrong somewhere. There seems to be a feeling among those in the industry, charged with the coating of pipe, that defects of this nature may be broadly over-looked just because the pipe is to be buried in the ground and is not to be placed on exhibition. However, the fact remains that these defects are warning signals of something which should be corrected. They tell of losses somewhere else along the line.

Much Research Needed

The trio of enemies—*rust, moisture and soil reaction*—have, as stated above, bothered the officials and all connected with all pipe line companies, as well as those who are furnishing the pipe and the protective materials. It is not likely that all of these troubles will be solved without expending much time and many more thousands of dollars in research, but research engineers of all concerned are working on the problems.

So serious is the demand for something better that one company has gone to the extreme of spending thousands of dollars to put in a plant to porcelain enamel the interior and the exterior of their product, thereby jumping from the use of one of the cheapest forms of coating materials to one of the most expensive. Should this company be able to over-come some of the inherent objections to the use of porcelain enamel there are other points which will have to be considered, such as the handling in the mill, shipping the pipe in such a way so as to prevent chipping of the porcelain, suspending in such a way as to prevent crazing of the finish—due to the use of a long span between supports—and the consequent weakening of the glassy surface. Naturally all these points will tend to afford an opportunity for the trio—rust, moisture and soil reaction—to get in their defective work much more readily than would be the case were the type of coating used which has given fair satisfaction over a period of years.

Lastly, the question of patching porcelain, once it has been chipped, is something to be given much serious thought. As an important guide on this point industrial plants engaged in the manufacturer of parts to which porcelain finishes have been applied have as yet not been able to reclaim chipped parts. They have either to sell them as "seconds" or junk them. On the other hand, if it is possible to over-come the defects in the porcelain process of coating so as to make it practical, as a pipe coating, a long step will have been made in advance and it will pay the purchaser of pipe to pay the extra price for the finished product that will over-come all of the objections to the present system.

Obviously, one of the greatest expense items in the present system is the crude process of application and the large amount of common labor needed to perform it. This operation is performed on the ground when the laying operations are being performed.

New Refrigerant Is Non-Inflammable and Practically Non-Poisonous

THE recent development of a refrigerant known chemically as dichloro-difluoro methane promises to contribute greatly toward safety in automatic refrigeration. This compound is non-inflammable, and is also practically non-toxic.

In a study of the toxicity and possible detriment to health from inhaling vapors of this compound, the United States Bureau of Mines has found that dogs, monkeys, and guinea pigs suffer no deleterious effects after being exposed to air containing as much as 20 per cent of this vapor for 7 to 8 hours daily over a period of several weeks. Eeach day during the exposure the dogs and monkeys appeared to experience sensations of alcoholic intoxication, but they became normal in a minute or two after the exposure and ate heartily. This sensation was also experienced by persons who breathed the gas; they also recovered in a minute or two without subsequent nausea or headache. The exceedingly high concentrations used in these experiments would be practically unattainable even in small kitchenettes in homes.

The amount of dichloro-difluoro methane in air that would be required to cause death after several hours exposure is about 300 to 500 times greater than the least toxic of the present day refrigerants. This compound also has possibility of wide use in cooling air for public buildings, perhaps in the near future for cooling the air of homes.

Responsibility for Accidents

E. J. KREH

Manager, Accident Prevention Bureau, Equitable Gas Co.

Workmen protected by gas masks while laying pipe through old garbage dump

EXPERTS who have studied the fundamental causes of accidents tell us that approximately 80% to 90% of all accidents are directly chargeable to failure of supervision. Lack of training wherein supervision fails in the majority of cases. By supervision, I do not necessarily mean the foreman. It rises higher than that, because in many instances the foreman is blamed when in reality he failed because he was not properly instructed, as illustrated by this example:

An Italian laborer had both eyes blown out while he was tamping dynamite into a hole. The method of exploding the dynamite was to run one lead to the rail of a nearby trolley track and attach the other end to the trolley wire. While the tamping was in process, one end of the wire was fastened to the rail and the other end was lying in a puddle of water. A passing street car, a poor bond in the rail, and the leakage current drifting from the rail through the dynamite cap into the puddle of water exploded the dynamite. The employee had no instructions on the proper method of doing the job. Inquiry developed that the foreman had no instructions and did not appreciate the hazard. The responsibility for this accident, without doubt, is upon the superintendent who failed to properly instruct his men and foremen in the proper method.

Whose fault is it when an employee suffocates while inside a gasoline tank? True, he wore an all-service gas mask which he and the foreman believed was ample protection. No one had instructed either that there was liability of lack of oxygen, for which reason, a self-contained mask was not the proper kind to use. Surely, the blame rises to the superintendent for lack of training.

When a ditch caved in and killed a number of men recently in one of our cities, is it the fault of the working man or the fault of supervisor because the ditch was not properly braced? The foreman knew the hazards, but negligently failed to guard against them and did not instruct his men.

When one man rams a pick into the back of another while they are working in a ditch, would you call it man-failure or lack of proper job training and discipline? Even if it be discipline, supervision fails when men disobey rules, for training and instruction insures discipline.

When one employee, because of horseplay, murders another one with his use of an air hose, would you call it lack of discipline, and did not supervision fail for permitting horseplay on the job?

When an employee disobeys a rule or an instruction and as a result is killed or injured, is that not a reflection upon the foreman's ability to train and control men?

Incompetency of Foreman

Lack of training also stimulates many unsafe practices. Recently two men were observed standing on a 2 x 6 plank elevated 20 feet in the air and supported on channel irons 24 feet apart. The planks sagged very considerably and it was more good fortune than aught else that a serious accident did not occur. Had these men been properly instructed in what was the safe load for scaffold planks, they would not have taken this chance. It was also an indication of poor discipline and poor leadership. That foreman did not know how to plan the job.

The accident curve rises near quitting time every day. Hurry and haste to get through and off the job are the underlying causes and they in turn spell lack of control, lack of discipline and lack of training. Haste has caused many a fatal accident. As an example, a man mounted a pole which he and the foreman knew was decayed. He was instructed to guy it, but because of hurry, he took a chance. The pole fell with fatal results. That's a reflection upon the foreman's discipline training and control of his men.

Who can deny that supervision is responsible for poor housekeeping, which contributes in quite a substantial degree to the cause of accidents. When pipes are piled improperly and because of such piling one rolls on a child, is it the fault of the man who did the piling or primarily the fault of the man in charge? When men trip and fall or cause other injury to them-

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Abstract of paper read before Pennsylvania Natural Gas Men's Association, June, 1930.

selves because of obstructions in the aisles and passageways of the shop, would you place the responsibility upon the man for not looking where he was going, or upon the superintendent or foreman for failure to have the place in good order, and by control and training keep it that way?

Where accidents result because of improper or poor illumination, and there are many such, is the responsibility the man's or is it the job of the management to see that the place is properly lighted?

Who is responsible for planning, for the lay-out of machinery, the lay-out of operation, the development of processes, the design of equipment and the development of methods for the work? Is it not the supervisor, in fact the very job of supervision is to plan and analyze, to train, to inspect and check results. Yet in many compressing stations, machine shops and other locations we find evidences of poor lay-outs, which are conducive to accidents—moving belts near aisles, unguarded gear wheels, unsafe methods and bad design. How many well engines have no guards about the fly wheels? What are you planning to reduce the hazard of starting a well engine by tramping? If an accident occurs from that cause, who is to blame?

When a Foreman is not a Foreman

When protective devices are not made use of, whose responsibility is it? We all know that frequent accidents occur because no goggles are worn, yet when the foreman is approached, he says he has done all he can. If any foreman cannot control his men and train them to do as he directs, he is not worthy of the name of "foreman," and every time a man violates a rule and fails to use a protective device, there is a reflection upon the ability of that foreman to train and control his men. Where an accident results because there is no guard provided on that engine fly wheel, most certainly the responsibility is upon the management and not upon the man on the job.

Defective tools, devices and equipment cause many accidents. These things are directly in the control of the superintendent. If mushroom heads are allowed to exist, they do so because they are sanctioned by the superintendent. If men make a habit of using an improper tool or device such as a wrench for a hammer or a wrench too small for the pipe, they do so because their act is mentioned and approved by the foreman or because he has failed to train them. Other accidents result because of lack of proper inspection, and maintenance of tools and devices. They, too, exist because they are sanctioned by the foreman and superintendent. Where unsafe building conditions exist and contribute to the cause of accidents, they also are chargeable to supervision. In fact, there are very few accidents which occur which cannot be directly or indirectly charged to supervision. Even in the case of diverted attention on the part of the employee or inattention, we can place the fundamental cause upon the supervisor for not removing the cause of this condition before the accident occurs, as illustrated by the following example:

A factory employing both men and women was located on the third floor of a building, the access to which was by means of a stairway on the outside of the building. Many falls were occurring on this stairway. An investigation disclosed the fact that the pretty ankles of the girls had more attraction for the men than keeping their eyes on their step, and as a consequence, they looked up instead of down while descending the stairs, falls resulting. A barrier shutting off the view remedied the cause. That was the job of the management to remove the cause of the diverted attention. A keen supervisor would have seen the condition and remedied it before the accidents occurred.

Not a few accidents are caused because of mental or physical defects in the employee, but even in that event if the foreman on the job knows his personnel as he should know them, he will have discovered these mental and physical deficiencies before they are the cause of an accident. For example:

A rigger had a number of falls from a rig. He was quietly observed by the Safety man, who noted a peculiar shifting about while in an elevated position. Questions developed the fact that he was seized with violent cramps in his feet while on the rig and as a consequence was required to change his position frequently and admitted with tears that he should not be a rigger, but he needed the money. He was examined, a serious physical defect discovered and placed on another job and the accidents ceased. The foreman could have and should have discovered that defect. If a gas compressor is not functioning 100%, he finds the cause and remedies it. Why not find the cause for the failure of the human machine. That, too, is the responsibility of the supervisor.

If men fail, it is because supervision has failed. If we could have supervisors understand that one reliable measuring stick of their efficiency is their accident record, much progress would be made. A good accident record of a superintendent, supervisor or foreman spells ability to plan and analyze the job, ability to train, good leadership, discipline and loyalty.

A bad record means the reverse. There is too much effort to place the responsibility for accidents upon the workman and not enough acknowledgment on the part of supervisors and management of their own failings. This is not true of operation. It there is a failure in service, the chief executive of the company answers for that failure and does not blame it on the men on the job. Neither does the superintendent lay the blame on the men on the job, but accepts the failing as his responsibility and takes ways and means to prevent the reoccurence. Why should it be different when men fail. They are in the control of management just as surely as pipe lines and compressors.

The Reason for Safety First Work

Some managers tell us that they are interested in safety for humanitarian reasons. That is partly true, but to the extent only that one human being has consideration for the feelings of his fellow men. Some say the reason is economic. Again only partly true. Some say it is for the improvement of industrial relations. Again only partly true as the results are too intangible. There is one real reason, however, and just as soon as each of us appreciates it, the more rapid will the progress be in Safety. It is this: A high accident record means poor management and no manager wants that record if he is interested in holding his job.

In conclusion let me again emphasize that the final and complete solution of the accident problem will come only when management and supervision fully accepts its responsibility for accidents, and charges itself with failure when each and every one occurs, remembering always that the right to tell a man to be careful carries with it the responsibility of telling him *how* to be careful and that means proper selection, placement and training of men.

Gas Has a Place in the Kitchen

The Home For B. T. U. 'S

The Importance of Properly Selling and Maintaining Gas Appliances and Equipment

H. T. EAST,

Assistant to Vice-President, Public Service Company of Northern Illinois, Chicago, Illinois

DON'T blow out the gas" was the instruction posted near every gas jet used to illuminate the rooms of hotels and public buildings not so very long ago. This means was utilized to educate users of gas in the proper operation of the consuming equipment and as a safety measure. Despite this precaution the metropolitan papers almost daily carried accounts of instances where the instruction had not been followed and asphyxiation resulted. The use of gas for illuminating purposes has practically disappeared in this country but failure of customers to understand the value of their appliances and the best method of operating them still exists to some extent.

With the possible exception of its use for asphyxiation purposes, a practice which we energetically discourage, virtually all the gas furnished to and used by the millions of gas customers scattered throughout the world must pass through the burner of some appliance before it can serve any useful purpose. Gas appliances, therefore, are extremely important adjuncts to the gas business.

Although the number and variety of gas appliances does not approach that attained in the electrical field there are many types of gas consuming devices and a great variety of types, styles and sizes of each. A better understanding of these outlets for our product and a truer realization of their place in the industry would be a distinct step forward in the building of customer relations and increasing gas sales.

Since practically all gas is nowadays used in heat application, the important part of appliances and equipment is the burner. The gas which is manufactured by the utility company and delivered to the consumer's outlet is not a usable commodity. It must first be mixed with air in proper proportion before it will burn and deliver up its heat units. To provide for differences in heating value, pressure and specific gravity, gas burners are adjustable and every burner must be adjusted to its particular gas and application. This adjustment is a rather delicate one which must be made by one who knows the proper mixture to obtain complete combustion and best results. Since conditions sometimes vary it is not sufficient to make the original burner adjustment but this must be checked and changed from time to time during the life of the equipment.

Gas Men Best Qualified

Naturally, gas men are best qualified to make burner adjustments and it has come to be considered a duty of the gas company to see that customers' appliances are so tuned that the customer will obtain the maximum benefit from the gas which has passed through his meter. In many cases state public utility commissions have ruled that it is a duty of the gas company to adjust burners in customers' premises so that they will function properly and as a general rule the company is not permitted to make any charge for this service. Gas companies usually accept this obligation and conscientiously strive to carry out their function by properly adjusting all new equipment, responding to calls for readjustment and making periodic inspections to determine whether the customers' appliances are functioning in a satisfactory manner.

Appliance repair is another feature of gas company operation which does not always receive the attention which it deserves. Appliances and equipment which are not in proper working order result in unsatisfactory service to the customer and since the consuming public only buys gas for the service which it performs the gas

This room was converted from a cellar by gas house heating

company is often blamed for poor service which is entirely due to inoperative or poorly functioning customers' equipment. It is also true that much business is lost due to defective appliances and burners. Systematic surveys undertaken by some gas companies show a surprisingly large number of burners which have not been used for some time because they were not in usable condition. Had these been kept in good repair many additional thousands of feet of gas would have been used. Viewed from any angle, therefore, the repair of gas appliances is a matter in which gas companies have an undisputed interest, even if it is not an obligation.

Many companies repair gas appliances without charge, some even going so far as to furnish small repair parts free. Since appliances are invariably owned by the customer no one will contend that the gas company is required to make repairs on them without charge and operating companies which have undertaken to do so adopted the policy because of their belief that the returns through greater sales of gas and improved public relations was worth more than the expense incurred. Unless it can be shown that the company would gain by the adoption of a free repair policy there is no need for placing it in effect since customers, by experience with other classes of repair service, naturally expect to pay for labor and parts necessary to place equipment which they own in good working order. Needless to say the charges for this service should always be reasonable and the work done promptly and efficiently.

Surmounting A Difficulty

One great difficulty experienced in appliance repair work has been the reluctance of customers to order repairs made before obtaining some idea as to what it will cost them. This necessitates an inspection of the defective appliance or equipment and an estimate of the cost of parts and labor necessary. Even when this is done the cost frequently amounts to more than the estimate, which makes necessary a higher charge than that quoted the customer or the sustaining by the company of a loss on the particular job. To get around this difficulty some companies have placed in effect a repair policy whereby a fixed charge is made for service calls for the purpose of making repairs where the time spent does not exceed thirty minutes. Repair parts are billed at cost. This policy has been found to have many advantages and is being widely adopted in the utility field today.

Every gas man knows that increasingly large quantities of his product are being used for industrial purposes. This market is only obtained after careful study of the wholesale customer's requirements and a careful figuring of the costs. After the industrial customer has been sold upon the idea that gas is the ideal fuel competent combustion engineers work out the best method of burning the fuel to obtain the results desired in the particular case. After installation the equipment is carefully attended by qualified men who keep it in good working order.

When we pass from the industrial field to the great home market we find that a different condition exists and it is well at this time to point out that although the total consumption in the home market may not approach the figures reached by the industrial load, it is none the less important since it is the great body of domestic users who make possible the gas business. They provide a good portion of the revenues necessary to make the gas company a going concern. The future growth and expansion of the gas industry will depend in no small measure upon the success attained in increasing the domestic outlet by devising appliances and equipment which will perform work which the customer wants done—cooking, refrigerating, drying clothes, incinerating, heating water and warming space.

Finding a Home for b.t.u's.

It might be said that one of the big problems of the gas industry is therefore to find a home for its b.t.u.'s. This is not entirely a selling problem since the rate payer must be satisfied with this service before it can be generally extended to his neighbors and the gas customer will not be satisfied with the service rendered unless he is equipped with efficient appliances, the operation of which he thoroughly understands and which are maintained and adjusted to give full satisfaction.

Gas appliances are not always sold in the right manner. The purposes for which they are intended are not emphasized as much as they should be and less essential features are frequently overemphasized. A visit to any appliance sales room will reveal many instances where sales people attempt to dazzle prospective purchasers with beauty of new color schemes, the distinctiveness of new fangled handles and modernistic design of appliances. Such salesmen frequently neglect to enlarge upon or even mention that the appliance in question will effectively and efficiently accomplish the purpose for which it is intended. To illustrate, a kitchen range may be sold because of the variety of color combinations in which it can be furnished, or the fact that it does not resemble a range and can almost serve as a card table after the dinner hour, without ever telling the customer how conveniently and efficiently the range will cook, bake and broil. After all it is being purchased for cooking, broiling and baking and not primarily as a decoration for the home and although it is proper to point out that the modern range is made for modern kitchens, designed and constructed so as to enhance the appearance of the home, this should not be the underlying theme of the sales talk.

The same thing can be said of other appliances. Water heaters, one of the best load builders for the gas company and an appliance which provides the purchaser a most valuable service, are now being manufacturer in pastel shades suitable for setting up in the parlor. If the salesman would accent the benefits derived from a plentiful supply of hot water, of proper temperature at all hours of day and night, the effect upon the industry would be better than that attained by emphasizing the appearance of an appliance intended for the basement. Efficiency is more important to the buver in this case than beauty.

The writer anticipates a storm of protest at this conclusion but it was only arrived at after a careful survey of customers' opinions of conditions which actually exist in various sections of the country.

Obligation Does Not End

The gas company's obligation does not end after the gas appliance is sold, in fact its obligation only begins with the sale. Somebody must see to it that the appliance is properly set up in the right location, the burner adjustments made and finally, that the housewife who is to operate it thoroughly understands how it works and how to keep it in good working order. Too little work of this kind is being done, although the home service departments of some companies have already adopted the policy of calling upon purchasers of appli-

ances after they have been placed in use to carefully instruct the owner how to obtain the most good from the device. This policy should by all means be adopted by companies which wish to render real service and have satisfied customers.

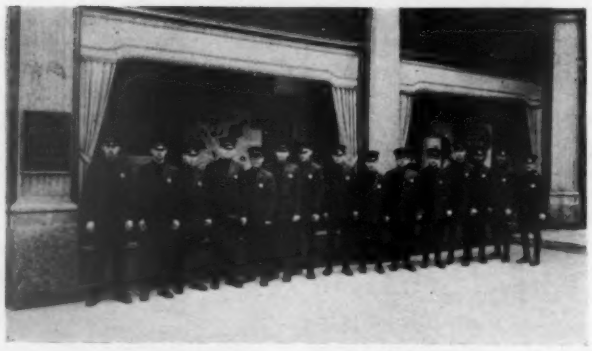
The problem of servicing customers' appliances and equipment is all important. As the industry expands its product is distributed over wider areas at greater distances from a local office. Many customers are served with natural gas in rural districts and towns which do not have local offices. The servicing problem becomes more difficult as we grow and expand. Appliances which get out of adjustment or in need of repair must be promptly taken care of if customer dissatisfaction is to be avoided and those which are not in proper working order but which have not been reported by customers must be discovered in some manner and given attention. This can best be done by sending service men to make periodic surveys on customers' premises to adjust burners, make minor repairs, furnish information and place the entire installation in good order. These inspectors can also collect data regarding appliances which might be used, thus providing valuable information for the sales department.

Although conditions are not so bad as to be called alarming a little observation will show that appliances and equipment through which our product must pass before it can be usefully employed by the purchaser have not received the attention which they deserve. In our zeal to sell new appliances the importance of taking care of those already in use is overlooked. This condition will not be remedied until the directive heads of gas companies recognize the importance of appliances in the home and take steps to see that the customer is educated regarding their use and they are kept in a state of repair that will assure complete and satisfactory service to the user.

A Fine Asset

THE matter of equipping meter readers and other gas employees who call at the home at regular intervals is becoming increasingly the vogue. The first efforts in this direction were oft times productive of the employee being rigged out with a uniform that was not only ill-fitting but made of material of questionable quality. It was no wonder, then, that many of the employees nursed a miniature grudge against the "powers that be" for having to wear such abominations.

Meter Readers of the Winnipeg Electric Co.



Brooklyn Union Gas Company Meter Readers

But, progress has been made in this as well as other phases of gas company activities, so that today the uniform worn by the employee is made of the highest quality material and is made to fit the particular individual. Such uniforms, two types of which are herewith depicted, reflect credit on the Gas Industry as a whole and are fine assets for building good will.

A Request

GAS fired boilers in the one hundred pound pressure class for process steam installations have always been of the fire tube or water tube type construction. In probably one third of the states of the United States, either or both of these types have been entirely satisfactory. They have been fairly long lived and reasonably efficient. Gas burners and automatic controls have been constantly improved. Heating surface has been increased to the point where these one hundred pound small industrial boilers show surprising results in their class. In other words these boilers are good.

The key point of this item is that the above types of boilers are satisfactory in only certain sections of the country, namely in those sections where feed water conditions are satisfactory. In the middle west at least, feed water conditions vary only from bad to worse. Fire tubes are eaten away. Water tubes clog solid in almost nothing flat. Refueling jobs are the bug bear of the small boiler user and tend to drive him insane. One cannot expect the user of a one horse, five horse or ten horse boiler to put in elaborate and expensive feed water treating systems.

What is the answer? Is it a flueless boiler? Hardly a flueless boiler such as the ordinary run, or the present coal fired type. To burn gas efficiently and economically for process steam there must be heating surface to throw away, and therein lies the problem.

To the writer's knowledge there is no such boiler on the market. Is there a flueless boiler built to the A. S. M. E. Code, gas-fired and developing at least seventy per cent efficiency from the gas consumed? Not a heating boiler, but a boiler that will operate at seventy-five or a hundred pounds pressure to operate pressing machines, washers, sterilizers and what not.

Let some manufacturer be the first in the field and collect accordingly from at least two-thirds of these United States. Maybe he will, and we hope shortly, for apparently the market awaits.—*J. H. Bell, Vice-pres., P. M. Lattner Co.*

The Gas Producer

I—Continuous Producer

JOHN W. ROMIG

(*Continued from May issue*)

THE contents of a gas producer in operation are stratified to a certain extent. The physical conditions existing in a continuous producer while gasifying a fuel are shown in figure No. 3. There are four chief strata or zones in a gas producer; starting with the upper or top zone, they are known as the green fuel bed or distillation zone, the reaction and dissociation zone, the combustion zone or incandescent bed and the lowest zone is the ash bed. During operation the fuel is admitted at the top of the producer and falls upon the fuel bed. As the reactions take place, the fuel gradually works its way through the intermediate zones to the ash bed, the ash and clinker being removed from the water pan. Steam and air are admitted through the grates or tuyeres and as it is under a greater pressure than the pressure above the fuel bed, it works up through the different zones.

Origin of Data

There is little information available as to actual temperatures in the various zones of industrial gas producers. Most information is assumed from data taken and from calculations. The subject of zone temperatures is difficult to analyze, and if the information were available, it would not be of great value in operation or resting. It is known that temperatures exceeding those required to fuse low fusion point ash are exceeded frequently, as fused ash (clinkers) is common with coals having an ash fusion temperature of below 2300° Fahrenheit. The existing temperatures are dependent upon fuel and operation; an excess of steam will cool the hot zones and an insufficient supply of steam will cause a heating of the hot zones with resultant ash fushion. It is safe to say that for the purpose of reaction discussion, temperatures of around 2300° F. or higher exist in the hottest part of a gas producer incandescent bed.

No reactions take place in the ash bed. As the water vapor and air pass up through the combustion zone, carbon unites with the oxygen from the air with the following reactions:

1. $C + O_2 = CO_2$
2. $C + O = CO$

It is probable that reaction No. 1 is more predominant in the lower part of the combustion zone than No. 2, although both reactions are known to take place, reaction No. 2 becoming more predominant at the top of the

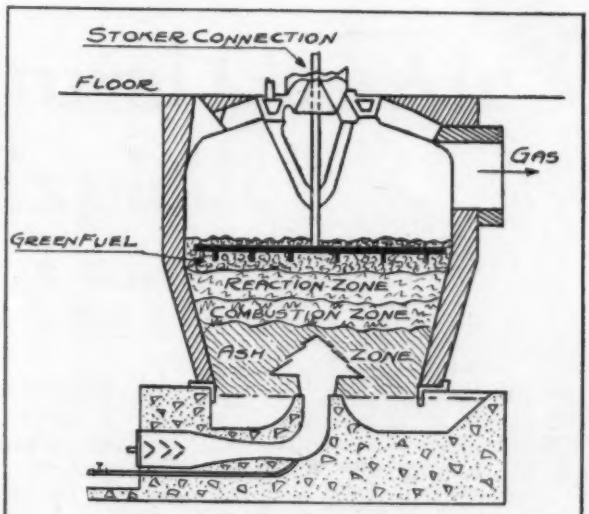


FIG N° III - ZONES OF A WATER GAS PRODUCER

combustion zone and in the dissociation zone. A part of the water vapor undoubtedly dissociates into H_2 and O_2 while passing through the upper part of the combustion zone, and further dissociation takes place in the reaction zone. The reactions are as follows:

3. $H_2O + C + heat = H_2 + CO_2 + CO + H_2O$
4. $CO_2 + C = 2CO$
5. $2H_2O + C = 2H_2 + CO_2$
6. $H_2O + C = H_2 + CO$

As the carbon unites with the oxygen from the air in the combustion zone 14,544* b.t.u. are liberated per pound of carbon, uniting to form CO_2 and 4350* b.t.u., when CO is formed. The temperature, being around 2300° F., is sufficient to cause a part of the water vapor to break down into H_2 and O_2, a reaction requiring 61,523 b.t.u. per pound of water vapor dissociated; the quantity of water vapor decomposed is dependent upon the heat furnished from the carbon and oxygen reactions for the dissociation of H_2O requires heat. At temperatures of over 1700° Fahrenheit, CO_2 becomes an active oxidizing agent and therefore will react with carbon to form CO according to reaction No. 4. A part of the water vapor will unite with carbon, releasing H_2 and forming, as in formula No. 5, CO_2, while a lesser part will unite with carbon to form CO, as in formula No. 6. At temperatures below 1700° Fahrenheit, the reaction of water vapor and carbon tends to form CO_2 rather than CO, while at higher temperatures the reverse is true.

Reaction Knowledge Vague

Knowledge of the reactions existing in the distillation zone is rather vague; however, the greater part of the action in this zone is purely destructive distillation of the volatiles in the fuel. Heat for the distillation is carried by the hot gases leaving the reaction zone. The gases evolved from the distillation zone consist of N_2H_2, CH_4, C_2H_4, (CnH_{2n}) and H_2O chiefly. In all coals containing sulfur, there are reactions involving sulfur and its combination with oxygen. However, these reactions are neglected in the course of calculation, as the errors introduced are small because the compounds from sulfur are analyzed as compounds of carbon.

* *Julius Thomsen's "Thermochemical Investigations."*

For the purpose of calculation, the following combining proportions are necessary:

7. $C + O_2 = CO_2$
   Combining proportions,
   (a) By weight — Pounds.
   $12 + 32 = 44$
   (b) By volume — Cubic feet,
   $1 + 1 = 1$
8. $C + \frac{1}{2}O_2 = CO$
   Combining proportions,
   (a) By weight — Pounds.
   $12 + 16 = 28$
   (b) By volume — Cubic feet,
   $1 + \frac{1}{2} = 1$
9. $2H_2 + Heat = 2H_2 + O_2$
   Combining proportions,
   (a) By weight — Pounds,
   $36 + Heat = 4 + 32$
   (b) By volume — Cubic feet,
   $2 + Heat = 2 + 1.$
10. $2H_2O + C = 2H_2 + CO_2$
    Combining proportions,
    (a) By weight — Pounds,
    $36 + 12 = 44$
    (b) By volume — Cubic feet,
    $2 + 1 = 2 + 1.$
11. $H_2O + C = H_2 + CO$
    (a) By weight — Pounds,
    $18 + 12 = 2 + 28$
    (b) By volume — Cubic feet,
    $1 + 1 = 1 + 1.$

By means of the above proportions, the ratios of constitutents by weight or by volume may be readily calculated. When certain of the above reactions occur, heat is given out (exothermic reactions), and in certain other reactions, heat is taken in (endothermic reactions) as the reaction proceeds. Table No. 1, below, shows the principal reactions in the producer, and the heat of reaction or the heat required to produce the reaction.

Table No. 1—Heats of Reactions in a Gas Producer

Reaction	**Heat Liberated—Exothermic b.t.u. per Pound Carbon*
$C + O$ to CO	4,440
$C + O$ to CO_2	14,540
$H + O$ to H_2O	62,000
$CO + O$ to CO_2	10,100
Reaction	**Heat Absorbed—Endothermic b.t.u. per Pound Carbon*
$CO_2 + C$ to CO	10,100
H_2O to $H_2 + O$	62,000
$2H_2O + C$ to $2H_2 + CO_2$	6,120
$H_2O + C$ to $H_2 + CO$	5,890

** The values used in Table No. 1 are taken from "Tests of a Suction Gas Producer" by Garland and Kratz, Bulletin No. 50, University of Illinois Engineering Experiment Station; they agree closely with those of Julius Thomsen.*

Heat is taken from the incandescent bed by the endothermic or heat absorbing reactions and the gases are heated to a certain temperature, providing sensible heat in the volatile and inert gases leaving the producers. Soon after the fuel is deposited on the fuel bed, it becomes hot and volatiles are driven off in the gaseous form and intermingle with the gases passing from the reaction zone. While there are complex reactions between the gases, depending upon the temperature of the fuel bed and the gas zone, it is difficult to determine just what does happen during regular producer operation. If the temperature is under 1500° Fahrenheit, some of the carbon monoxide may react with excess water vapor and form CO_2 and H_2, while at higher temperatures CO_2 becomes an oxidizing agent. Low CO_2 and H_2 generally result from thick high temperature fuel beds, while thin low temperature fuel beds usually produce a high CO_2, high H_2 and low CO gas. In general, hot fuel beds are desired; however, with excessive inside temperatures when using low fusion point ash fuels, clinkering troubles are aggravated.

A mixture of gases leaves the producer at temperatures between 800 and 1500 degrees Fahrenheit, depending upon the fuel bed temperature conditions, and is then ready for washing or to be used as a combustible in a furnace. Table No. 2, below, shows the constituents making up an average bituminous coal producer gas.

Table No. 2—Producer Gas Constituents and Percentages for Bituminous Coal Gas

Constituent	*Percent as Analyzed by Volume.*	*Actual Percent by Volume.*
CO_2	7.0	6.44
O_2	.4	.36
H_2	15.0	13.81
CO	22.0	20.25
CH	4.4	4.05
C_2H_4	.3	.27
N_2	50.9	46.82
H_2O	Not Analyzed	8.00

The constituents of producer gas vary with fuels and vary with the operation of the producers. A hole in the fuel bed will cause a chimney action and reduce the heating quality of the gas. Fuel alone will not make a good producer gas, but a combination of proper attention with the proper fuel will give good gas economic operation through the formation of combustibles rather than the formation of excessive quantities of inerts.

In the combustion of producer gas, Table No. 3 is of interest, as it shows the reactions, proportions by volume and the products of complete combustion of combustibles (non-condensed) by volume. The table is of use in making calculations on a volumetric basis.

***Table No. 3—Products of Combustion of Combustible in Producer Gas. (By volume)**

Constituents	*CO_2 Formed*	*H_2O Formed*	*O_2 Required*	*N_2 accompanying O_2*
CO_2	—	—	0	0
O_2	—	—	0	0
$2H_2 + O_2$	0	2	1	3.81
$2CO + O_2$	2	0	1	3.81
$CH_4 + 2O_2$	1	2	1	3.81
$C_2H_4 + 3O_2$	2	2	3	11.43
N_2	—	—	0	0
H_2O	—	—	0	0

**H_2O is not analyzed by Orsat, as it condenses.*

Excess air is admitted for complete combustion of the gas for an oxidizing furnace atmosphere, while for a reducing atmosphere insufficient air is admitted for complete combustion. The kind of atmosphere necessary for a process depends upon the process if the combustion chamber contains the products to be heated.

In industry gas producers are more common than any other type of fuel gasifying apparatus. Probably the reason why they have been so universally adopted is that they will make a gaseous fuel with very little attention and with a minimum investment. It is not recommended that producers be operated without special attention; however, there are many installations today making gas and about the only attention the operation receives is conscientious poking when the fire becomes unruly. There are many things that can be done to improve industrial gas producer plant operation; by more scientific operation and by the selection of the proper fuel.

(September issue will deal with "Operation and Items Related to Operation")

When Will Natural Gas-Air Mixture Explode?

J. E. Crawshaw, of the U. S. Bureau of Mines Summarizes Tests in R. I. 3016

The lower limits of combustibility and explosiveness of natural gas in air are often of literally "vital" significance to the gas man. The recent report of the Bureau of Mines here summarized was intended primarily to show hazards incurred from such mixtures in mines where blasting occurs. The scientific facts are, however, also useful and applicable under manhole, plant, and customer-premises conditions for companies distributing natural gas.—Editor.

THE object of the tests reported was (1) to determine the lower limit of natural gas in a mixture of natural gas and air which would be ignited and propagate violently when the turbulence was produced by explosives fired from a cannon into the mixture; (2) to observe the behavior when the mixture contained less than this low limit; and (3) to determine how turbulence produced by a fan affects this limit.

Four series of tests were run, three of which were to determine the effect of different sources of ignition: Tests with (1) an electric igniter; (2) 3F black blasting powder stemmed with 2 pounds of dry fire clay stemming used to ignite the mixture, and (3) 40 per cent straight nitroglycerin dynamite unstemmed. The fourth was made to study the effect of turbulence produced by a two-speed electric fan, using an electric igniter as the source of ignition.

The tests were carried out in Gallery No. 1 at the Explosives Experiment Station, Bruceton, Pa. This gallery consists of a horizontal boiler-plate tube 100 feet long and 6 feet 4 inches in diameter, open at one end, with an observation window and relief doors in each section, approximately 6 feet 8 inches apart. In the closed end is an opening approximately 10½ inches in diameter through which the explosive was fired from a cannon into the gas mixture, which is confined in the first 20 feet of the gallery by paper diaphragms.

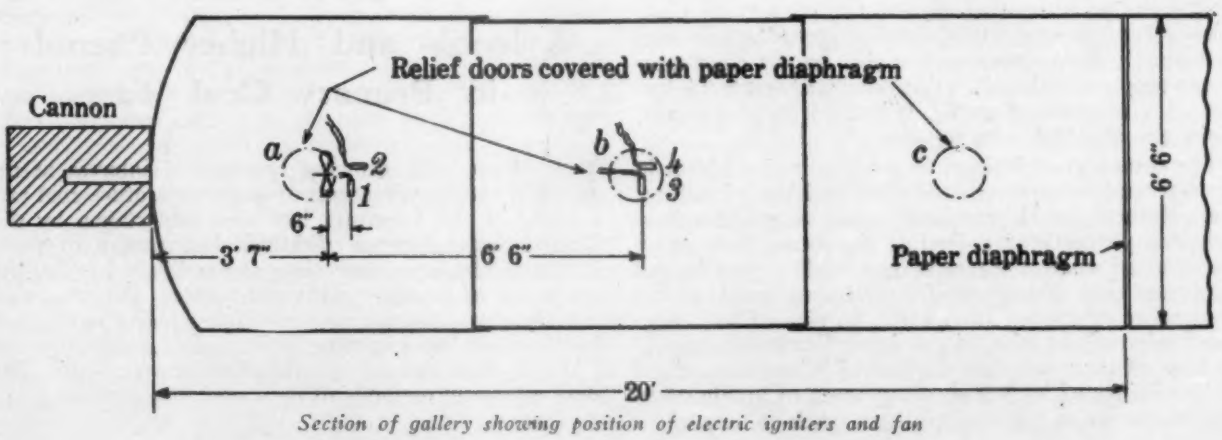
The natural gas used at the Explosives Experiment Station comes from a few wells nearby and has been found to be fairly uniform in competition, varying very slightly from day to day. An analysis of this gas by the fractionation method was: Carbon dioxide, none; oxygen, none; methane, 87.8; ethane, 6.9; propane, 2.6; butane, 0.8, and nitrogen, 1.9 per cent.

With certain mixtures, almost simultaneously with applying the current to the electric igniter or electric detonator, the paper diaphragms over the relief doors and the large diaphragms at the end of the 20-foot section burst explosively. Pale-blue flame shot out of the relief doors, accompanied by a violent expulsion of gas just as if the inflammation had spread rapidly in all directions throughout the whole mixture and had consumed all of the gas present very much like an explosion. To this behavior the term "explosion" has been applied.

With other mixtures, those containing less gas than when explosion was observed, the inflammation appeared to have spread more slowly through only part of the mixture and scorched the diaphragms; the large diaphragm burst after a perceptible interval and before the pressure had risen sufficiently to break the small diaphragms. To this behavior the term "inflammation" has been applied.

It is realized that even with these definitions the distinction between explosion and inflammation is in practice vague and arbitrary. The terms have been adopted merely to aid in the preparation of this report and to avoid the long descriptions of the results of each test which would otherwise be necessary.

The effect of turbulence on the lower limit of explosibility of the natural gas-air mixture is to bring about an explosion in mixtures containing a lower percentage of natural gas and which gave inflammations



Section of gallery showing position of electric igniters and fan

when still. This lower limit contained approximately 5.00 per cent of natural gas. The explosions were more violent in the turbulent mixtures than in still mixtures.

The position of the electric igniter, whether the flame is across the air current or with it, has a marked effect on the lower limit, probably due to the difference in the time the mixture is in contact with the flame. The velocity of the air current at the point of ignition for the same position of the igniter has an effect on the lower limit. This effect also can be said to be partly due to the time the mixture is in contact with the flame. The lower limit at which inflammations occur is not materially affected by turbulence.

The results obtained in these series of tests are summarized in the table below. The percentages of natural gas given do not mean that explosions or inflammation always took place with that natural gas content, but indicate the behavior observed in an individual test.

Means of ignition	Lower limit of explosion, natural gas, per cent	Lower limit of inflammation, natural gas, per cent	Velocity of air-current feet per minute
Electric igniter	5.5 to 5.7	4.4 to 4.6	No current
Black blasting powder	5.1	4.7 or lower	do
40 per cent nitroglycerin dynamite ..	5.6	(1)	do
Electric igniter, Igniter across air current	5.8	(2)	1,200
do, Igniter parallel to air current	5.3	(2)	1,200 and 1,050
do	5.0	4.4	315

(1)—Inflammation could not be definitely established as taking place.

(2)—Inflammation apparently did not take place with the higher air velocities.

Ethyl Mercaptan Found to be an Efficient Warning Agent for Detection of Leaks in Natural Gas Distribution System

ETHYL mercaptan, an organic sulphur compound, has been found to be a practical warning agent for the detection of leaks in natural gas distribution systems, as the result of investigations conducted by the United States Bureau of Mines, Department of Commerce. It is necessary that warning agents of this kind be distinctly malodorous, and in this respect ethyl mercaptan amply fills the bill, as its odor is characterized as that of a mixture of garlic, onions, decayed cabbage, sewer gas, and hydrogen sulphide.

The detection of leakage is a recognized problem in the safe and economic distribution and use of natural gas. Natural gas is practically odorless and therefore lacks the property of indicating significant leakage by the sense of smell, the means most widely used by gas employees and consumers for detecting leaks of the more odorous types of fuel gases. In view of the recognized value of the odor of gas for indicating leakage at the time of occurrence the Bureau of Mines has studied the possibility of adding small amounts of highly odorous substances to types of fuel gas (such as blue water gas and natural gas) that lack warning properties. These studies revealed that the mercaptans were promising substances to accomplish this purpose, not only for odorizing fuel gases but for other purposes where it was desired to give warning through the sense of smell.

In general, the mercaptans closely resemble the alcohols and are often termed thio-alcohols. They differ from the alcohols, however, in that the hydrogen may be replaced by heavy metals to form mercaptides. This reaction apparently takes place very slowly in natural gas pipe lines when the low concentration of ethyl mercaptan vapor necessary for warning-agent purposes is used.

Ethyl mercaptan has a very intense, disagreeable odor, detectable in dilutions as high at 1 part ethyl mercaptan in I billion parts of air, and will give warning to conscious persons in concentrations of 1 part ethyl mercaptan to 15 million parts of air or 0.01 pound per million cubic feet of air. It is by virtue of this disagreeable odor that it quickly elicits attention and response when used as a warning agent.

The odorizing of natural gas with ethyl mercaptan was found to be a practical means for detecting leakage and a much cheaper means than usual inspection methods. Concentrations of 7.7 to 9.3 pounds of ethyl mercaptan per million cubic feet of gas were found very effective in indicating house leaks. It is thought that half that amount or even less would be ample to indicate leaks of significant magnitude.

Concentrations of 31.0 to 46.5 pounds of ethyl mercaptan per million cubic feet of gas were found effective in indicating underground leaks in mains and service lines.

The use of ethyl mercaptan caused no complaints from customers unless leaks were present.

Since completing the studies mentioned, the Bureau of Mines jointly with the American Gas Association has conducted further investigations dealing with the use of warning agent for fuel gases. The results of this work will be published later.

Further details are given in Report of Investigations 3007, "Use of Ethyl Mercaptan to Detect Leaks in Natural-Gas Distribution Systems," by R. R. Sayers, A. C. Fieldner, W. P. Yant, R. D. Leitch, and S. J. Pearce, copies of which may be obtained from the United States Bureau of Mines, Department of Commerce, Washington, D. C.

Xylenols and Higher Phenols in Primary Coal Tars

IN view of the growing commercial interest in the higher boiling fractions of low-temperature coal tar, a study of the literature has been undertaken by the United States Bureau of Mines Department of Commerce, to obtain as many data as possible regarding the properties of possible pure constituents. The results of a study of various xylenols and higher phenols are given in Report of Investigations 2968, by E. J. Schneider and J. B. Shohan, recently published by the Bureau. The data relates to methods of detection, characteristics and derivatives.

Paving the Way for Good Natural Gas Service

P. McDONALD BIDDISON

Consulting Engineer, Southern Natural Gas Corporation

WE bring to you not only a useful commodity but a service, and I wish to point out that while your local merchant may sell to you a commodity and also render you a service, there is a vast difference in the respective conditions. Your local merchant may buy in an open market, securing his supplies today from one source and tomorrow from another, if he so desires. A natural gas utility cannot so purchase its commodity in the open market. It is restricted, in the first place, to the localities where the commodity is produced. It is again restricted by the fact that long-time contracts must necessarily be made which may later prevent taking advantage of closer and possibly cheaper supplies, and it is restricted by the fact that changing sources of supply almost always means added investment or a loss of investment in making the change.

The Manufactured and Natural Gas man alike will appreciate the straightforward presentation of facts in the recent address of Mr. Biddison delivered upon the occasion of Natural Gas being first used in Alabama for domestic purposes. This address to the prospective customers in Leeds should go a long way toward immediately establishing good public relations and should guarantee to the gas company a maximum utilization of the fuel energy it supplies to the community.

The business of a natural gas utility varies from that of the local merchant again in the respect that the cost of the commodity supplied by the local merchant constitutes the greatest proportion of the sale price, while his interest charges, sales costs, and service costs, such as delivery of commodity, accounting, etc., generally constitute a small portion of the sales price. With a natural gas utility the interest charges, depreciation on property, and the cost of giving service constitute the larger portion of the price received for the commodity.

A local merchant will expect to have annual sales of several times the amount of his investment, but a public utility, because the greater part of the value of its sales is of service and not of commodity, may have annual sales amounting to only a small fraction of its investment. Another difference between the local merchant and the utility exists in the relative freedom in regard to rates for the commodity. Your local merchant is free to secure such prices as the quality of his product and the demand therefor will enable him to secure in a free and open market in competition with other merchants handling similar commodities. He is unhampered and unregulated as to rates. The public utility, however, is not free to sell to the general public without control on its prices.

On the theory (which theory I believe sound) that more economical operation of utilities may be had if a utility has a practical monopoly in the field served, the rates which a utility may charge have been by law made subject to the control of a utility commission. Therefore, while the utility is free from competition in most cases and may, therefore, be said to enjoy a monopoly, yet its business, the rates which it may charge, and the rate at which it may earn upon its investment, are under the control of either elected or appointed public officials, whose duty it is to protect the public against the evils inherent in a monopoly and to fix rates for the utility at which the utility can earn no more than what is considered a fair return on the value of their property. This rate of fair return may vary from 7% to 10%, depending upon current interest rates and the hazards of the business. You will appreciate that none of your local merchants could afford to go into business on a bare earning of 10% of the capital required. He depends upon turning over his capital several times yearly and upon selling his property. The utility depends upon retaining its property substantially intact and deriving a rent therefrom.

We are bringing to Leeds one of the greatest conveniences which the public of any community can have, Natural Gas. As a general proposition communities of less than 5,000 people cannot support a manufactured gas system, and were it not for the fact that Alabama Natural Gas Corporation will serve a number of communities similar in size to Leeds, thereby effecting a saving in operation and supervision, it would not be possible for this community to enjoy gas service. This reduction in expenses by consolidation of properties is a world-wide movement, and when you hear criticism made of these consolidations into large systems, bear in mind that it is only through such consolidations that service to many of our small communities by these utilities is at all possible.

The business of Alabama Natural Gas Corporation will be handled by men experienced in the duties they are to perform. We believe we have chosen men who know your needs and know how to provide for them; they know what service means and are prepared to render it. If they fail in either respect, our management wants to know of it, and our management wants you to feel free to call upon these men for information, advice and help in the application of gas to your uses. Our employees will be citizens of the communities we serve, and as such they will be interested, as will be the management of their Company, in all your civic functions and problems. We want to see your community grow, and to assist in that growth.

I want to briefly tell you something about natural gas. It contains no poisonous elements; it is not by itself explosive; when mixed with air in the proper proportions it is explosive; when properly burned, the products of combustion are not poisonous. These products of combustion, when combustion is complete.

are nitrogen, carbon dioxide and water vapor, all of them harmless, and all of them found in the air we continually breathe. However, if you fill a room with these harmless products of combustion so that the oxygen which we require to sustain life is excluded, suffocation will result. Therefore, the gas burning appliances should have flues to carry off the products of combustion or the rooms in which such appliances are installed should have suitable ventilation. An improperly adjusted appliance may only partially burn the gas, and partially burned gas produces carbon monoxide, which in concentrated quantities is poisonous. You should see, therefore, that your appliances are kept in adjustment. A properly adjusted appliance produces a blue flame. A white flame, or a flame with an excess of white tip or a smoking flame indicates partially burned gas, resulting from insufficient air and improper burner adjustment. Such a flame will produce a carbon deposit on your appliances and produce carbon monoxide. It is inefficient to use gas in such a manner and unhealthy to do so unless the appliance be connected to a chimney. Our local employees will adjust your appliances and instruct you as to how to utilize them.

Establish Moderate Rates

We have established rates for our product which will enable you to put it to every use for which heat is required. You may cook your meals, provide hot water for the home, run an automatic refrigerator, heat your home, and run your factory with natural gas. For these various purposes there are available appliances of styles and qualities to fit all pocketbooks, and we have made available a system of payments whereby the cost of such appliances may be distributed over a sufficient time to enable anyone who so desires to completely equip his premises to use natural gas. You can purchase a high grade efficient durable kitchen range for less than $30.00 installed. And while we are talking of kitchen ranges, I would like to point out that for the average family the cost of gas for a kitchen range, plus the payments for purchase of the kitchen range, will be found to be less than the charge for current for an electric range for the same service. An installation for an ample supply of hot water for the ordinary sized family can be made for less than $30.00. The most efficient type of room heater may be had in various models, varying only as to character of finish and durability, from as low as $16 to as high as $64 installed, while a less efficient type, but one quite generally in use, may be installed for less than $10. Your old coal stove or your old wood stove can be converted to use natural gas with a small expenditure, but it is not advisable to do so because such converted outfits are so inefficient that the consumer would save money to discard them and purchase low priced natural gas equipment. Your house-heating furnace can be readily and efficiently converted to burn natural gas at prices from less than $100 up to $250, depending on the size of installation and the degree of automatic control which you desire.

The commodity we offer is the premier of fuels. Its cost to you for cooking and water heating purposes is about half the usual cost of manufactured gas for the same purposes, while for house-heating and industrial purposes its cost is competitive with other fuels, over which it has the advantage of cleanliness and convenience. Many of its advantages are difficult to value in dollars and cents. The ability to set a regulator on your range oven to maintain the exact temperature you desire and have the heat automatically shut off at the time you have predetermined is a convenience of value, but I do not know what it amounts to in dollars per year. The saving in laundry and cleaners bills on clothing, draperies, wall paper and rugs due to the absence of smoke and soot in a gas consuming town is a very considerable item, but I am not able to express it off hand in dollars per year though I have a keen appreciation of it by comparing Birmingham with the gas using communities in which I have lived. The ability to have a fire instantly at the turn of a valve instead of waiting for development from a bunch of kindling, the elimination of carrying in fuel and the carrying out of ashes, the ability to have hot water without limit as to quantity at the turn of a valve, and the ability to regulate the amount of heat to suit your exact requirements are all conveniences of real value, inherent in gas, but not in any other fuel, though it would be difficult to express their value in money.

We are here to sell gas, and in selling it we must of necessity teach you how to use it economically, because the more economically you use gas, the more readily can you afford to put it to additional uses, securing additional conveniences, and our whole hope of profit in our business is based upon selling a large volume of gas. It is, therefore, to our interest to serve you well. Our operations are not free from difficulties, but our systems are designed and built by experts of the best of materials, operated by trained employees, and we pledge you the best service that it is humanly possible to give, and we ask your cooperation in our efforts to give it. If there be at any time any failure on our part to completely fulfill this promise we want you to tell us about it, either at our local office or our general office in Birmingham to the end that we may know where we have failed and may thus be enabled to correct the fault.

Motion Picture Advertising For Public Utilities

GAS and electricity, by creating leisure for the masses, have been largely responsible for the development of the motion picture industry, so that it is not going too far afield if moving pictures are now used by gas and electric companies to create more leisure and thereby furnish still larger audiences.

We have the authority of a national figure in the utility industries, Thomas N. McCarter, President of the Public Service Electric and Gas Company of New Jersey, for the characterization of motion picture advertising as "the greatest and most influential factor in engendering good will, consolidating good will, and putting before the public the true and vital picture of the far flung operations and the magnitude of the effort employed by public service corporations to serve a community."

Without excluding any other medium of advertising, we can easily admit that the advertising motion picture may be used as a valuable supplement to any type of advertising campaign. It offers attention without competition, since obviously no competing line can advertise its product while yours is on the screen. It is the nearest available approach to television advertising, since it offers an actual demonstration by sight and sound of the article or services offered.

Henry Obermeyer, before Annual Convention of Public Utilities Advertising Association.

XII-Calculating Househeating Requirements

SO FAR, the heating requirements have been stated merely from the theoretical standpoint of heat loss from the building. To evaluate the outside weather conditions, the term degree day was devised by the American Gas Association. It represents the product of the number of degrees the mean daily temperature is below 65° and the number of days. It was found that no gas was used for heating when the outside temperature was above 65°. The temperature of 65° is also the average of 16 hours heating to 70° F. and 8 hours at 55° F. On the degree day basis, if the daily mean temperature for a period of 10 days has been 55° F. the number of degree days has been 100. This is the product obtained by multiplying together 10 (number of degrees the mean daily temperature was below 65°) and 10 (number of days).

Fig. 1 through the courtesy of the Heating and Ventilating Magazine, gives the isothermal line or lines of equal number of degree days for the United States, which can be used to give the heating load for any locality.

In selecting the boiler and radiators (or registers) to be installed, it is necessary to calculate the heat losses of each room and select the boiler from the totals.

The first step is to measure the exposed area of the building, separating into windows and doors, exposed walls, exposed floors, roofs and cubical contents. These total areas are used with the Radiation Charts (see Figs. 2 and 3) and the radiation needed to offset that heat loss read directly (see Fig. 4). Assume a room with an area of 160 sq. ft. of wall, its construction being Clapboard, sheathing, studding, furring, lath and plaster. The table gives this construction as corresponding to Curve 5 on the Radiation Table.

Following 160 up to the intersection of this curve, and then projecting horizontally to the Radiation Scale B, the value 10½ sq. ft. equivalent cast iron steam radiation is found. The heat loss of the glass (see Fig. 3) is also found and also the heat needed to raise the temperature of outside air which filters into the building, (see Fig. 2) through window and door cracks, loose building construction and through open doors. The total of all of these values give the steam radiation needed to properly heat the room to 70° against zero outside. Applying factors for other temperature ranges gives the area of radiation to maintain such conditions.

Radiation Tables

TYPE	T	T'	CURVE	SCALE
1. Outside Walls				
A. BRICK				
1. Unplastered	13″	—	7	B
2. Plastered Interior	13″	—	7	B
3. F, L, & P.	9″	—	4	B
	13″	—	11	A
4. F, L, & P. Ins. 1*	9″	1⅝″	10	A
	13″	1⅝″	8	A
5. F, L & P. Ins 2*	9″	1⅝″	9	A
	13″	1⅝″	7	A
6. F, Ins 3 & P.*	9″	1 layer	10	A
	13″	1 layer	8	A
7. F, Ins 3 & P*	9″	2 layers	7	A
	13″	2 layers	6	A
8. Ins 4 & P*	9″	1½″	6	A
	13″	1½″	5	A
9. Ins 4 & P*	9″	2″	4	A
	13″	2″	3	A
B. 4″BRICK VENEER ON 4″ HOLLOW TILE				
10. Unplastered	—	—	8	B
11. Plastered Interior	—	—	7	B
12. F, L, & P	—	—	12	A
13. F, L & P. Ins 1	—	1⅝″	9	A
14. F, L & P. Ins 2	—	1⅝″	8	A
15. F, Ins 3 & P	—	1 layer	9	A
16. F, Ins 3 & P.	—	2 layers	6	A
17. Ins 4 & P	—	1½″	5	A
18. Ins 4 & P	—	2″	3	A
C. STUCCO ON 6″ HOLLOW TILE				
19. Unplastered	—	—	10	B
20. Plastered Interior	—	—	8	B
21. F, L & P		—	3	B
22. F, L & P. Ins 1	—	1⅝″	9	A
23. F, L & P. Ins 2	—	1⅝″	8	A
24. F, Ins 3 & P.	—	1 layer	9	A
25. F, Ins 3 & P.	—	2 layers	6	A
26. Ins 4 & P.	—	1½″	5	A
27. Ins 4 & P.	—	2″	3	A
D. LIMESTONE, SANDSTONE, GRANITE				
28. Unplastered	12″	—	5	C
29. Plastered Interior	12″	—	4	C
30. F, L & P.	12″	—	6	B
31. F, L & P. Ins 1	12″	1⅝″	12	A
32. F, L & P Ins 2	12″	1⅝″	11	A
33. F, Ins 3 & P	12″	1 layer	12	A
34. F, Ins 3 & P	12″	2 layers	8	A
35. Ins 4 & P	12″	1½″	7	A
36. Ins 4 & P	12″	2″	4	A
E. CONCRETE				
37. Unplastered	8″	—	3	C
	12″	—	8	B

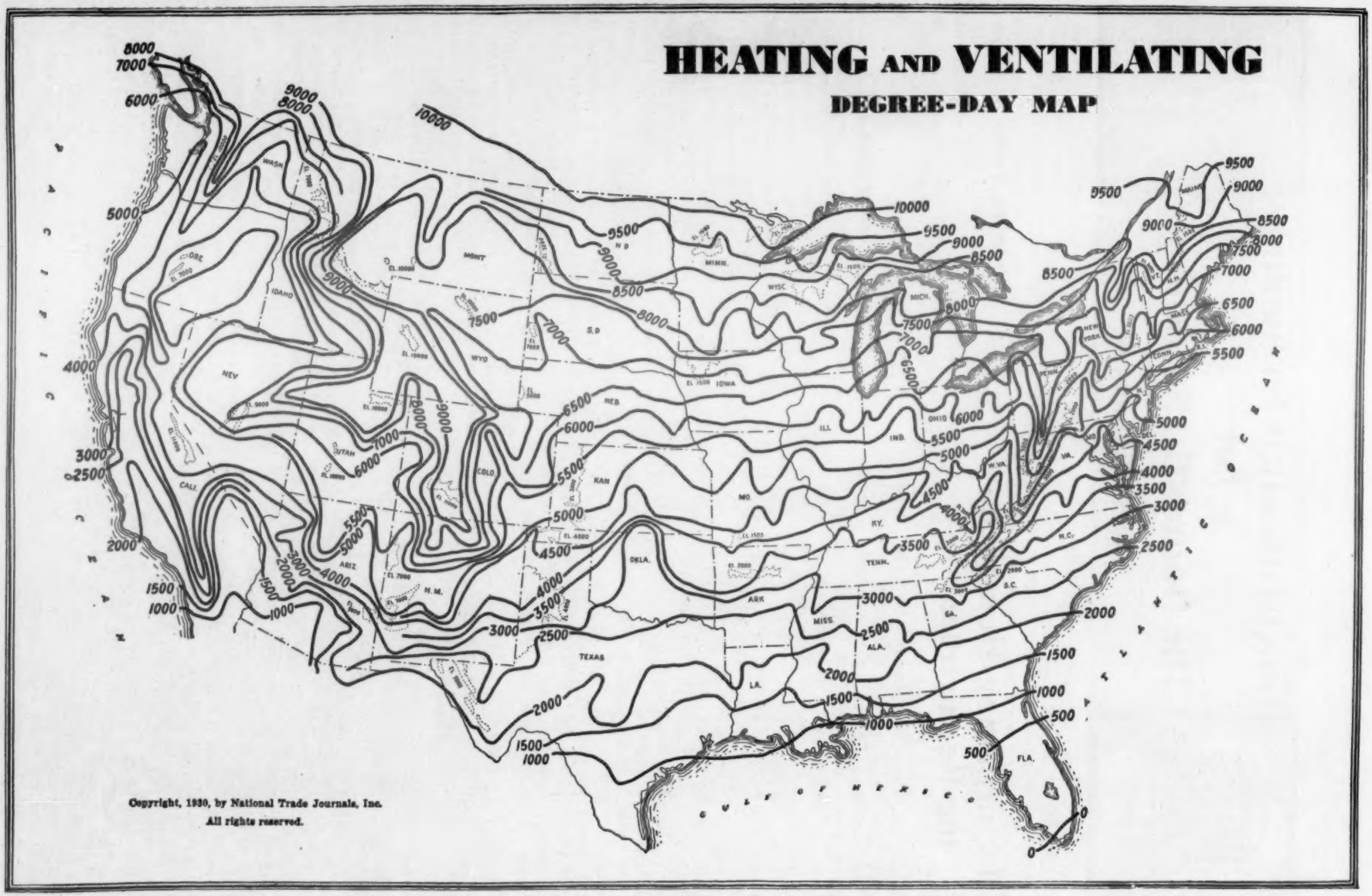


Figure 1—Degree Day Map of the United Sttaes—Courtesy "Heating & Ventilating"

38. Plastered Interior	8″	—	11	B
	12″	—	7	B
39. F, L & P.	8″	—	4	B
	12″	—	12	A
40. F, L & P. Ins 1	8″	1⅝″	10	A
	12″	1⅝″	8	A
41. F, L & P. Ins 2	8″	1⅝″	9	A
	12″	1⅝″	8	A
42. F, Ins 3 & P.	8″	1 layer	10	A
	12″	1 layer	8	A
43. F, Ins 3 & P.	8″	2 layers	7	A
	12″	2 layers	6	A
44. Ins 4 & P	8″	1½″	6	A
	12″	1½″	5	A
45. Ins 4 & P	8″	2″	4	A
	12″	2″	3	A
F. FRAME. Clapboard or Shingles				
46. Sh, St, L & P.	—	—	5	B
47. Sh, Ins 5, St. L & P.	—	1 layer	6	A
48. Sh, Ins 3, St, L & P.	—	1 layer	7	A
49. Sh, Ins 1, St, L & P.	—	3⅝″	4	A
50. Sh, Ins 2, St. L & P.	—	3⅝″	4	A
51. Sh, St, Ins 4 & P.	—	1½″	4	A
52. Sh, St, Ins 4 & P.	—	2″	3	A
53. Ins 3, St, Ins 3 & P	—	2 layers	9	A
G. BRICK OR STUCCO VENEER ON FRAME				
54. Sh, St, L & P.	—	—	4	B
55. Sh, Ins 5, St, L & P	—	1 layer	6	A
56. Sh, Ins 3, St, L & P	—	1 layer	7	A
57. Sh, Ins 1, St, L & P	—	3⅝″	4	A
58. Sh, Ins 2, St, L & P.	—	3⅝″	3	A
59. Sh, St, Ins 4 & P.	—	1½″	4	A
60. Sh, St, Ins 4 & P.	—	2″	2	A
61. Ins 3, St, Ins 3 & P.	—	2 layers	9	A

2. Floors and Ceilings (Exposed to unheated portions of Building)

Values obtained from the following curves must be corrected for proper temperature differences.

H. Concrete FLOORS LAID ON GROUND (Temperature Difference 20° F.)				
62. No Flooring	4″	—	7	C
63. Yellow Pine	4″	1″	3	C
J. INTERMEDIATE FLOORS AND CEILINGS (Temperature Difference 35°)				
64. Exposed Joists (no ceiling		1″ Y.P. —	4	C
		(13/16″ HW —	1	C
		)1″ Y.P.		
65. L & P		— —	6	C
		1″ Y.P. —	5	B
		(13/16″ HW —	4	B
		)1″ Y.P. —		
66. Ins 3 & P		— 1 layer	9	B
		1″ Y.P. 1 layer	12	A
		(13/16″ HW 1 layer	10	A
		)1″ Y.P.		
67. Ins 5, L & P.		— 1 layer	12	A
		1″ Y.P. 1 layer	7	A
		(13/16″ HW 1 layer	6	A
		)1″ Y.P.		
68. Ins 1 L & P.		— 3⅝″	6	A
		1″ Y.P. 3⅝″	5	A
		(13/16″ HW 3⅝″	4	A
		)1″ Y.P.		
69. Ins 2 L & P.		— 3⅝″	5	A
		1″ Y.P 3⅝″	4	A
		(13/16″ HW 3⅝″	3	A
		)1″ Y.P.		
70. Ins 4 & P		— 1½″	6	A
		1″ Y.P. 1½″	5	A
		(13/16″ HW 1½″	4	A
		)1″ Y.P.		

3. Roofs

K. FLAT ROOFS WITH FINISHED HUNG CEILING AND BUILT UP TAR AND GRAVEL ROOFING				
1. Concrete Base				
71. No Roof Insulation	2″	—	8	B
72. Ins 1 in Roof	2″	2″	10	A
73. Ins 5 in Roof	2″	1″	8	A
74. Ins 3 in Roof	2″	2 layers	9	A
75. Ins 3 in Roof	2″	4 layers	4	A
76. Ins 4 in Roof	2″	1½″	5	A
77. Ins 4 in Roof	2″	2″	3	A
2. Wood Base				
78. No Roof Insulation	1″	—	6	B
79. Ins 1 in Roof	1″	2″	9	A
80. Ins 5 in Roof	1″	1″	7	A
81. Ins 3 in Roof	1″	2 layers	8	A
82. Ins 3 in Roof	1″	4 layers	4	A
83. Ins 4 in Roof	1″	1½″	5	A
84. Ins 4 in Roof	1″	2″	3	A
L. UNHEATED ATTICS WITH PITCHED ROOFS				
1. Finished Ceiling No Attic Flooring				
85. No insulation	—	—	5	B
86. Ins 5 in Ceiling	—	1″	5	A
87. Ins 1 in Ceiling	—	3⅝″	1	A
88. Ins 2 in Ceiling	—	3⅝″	0	A
89. Ins 3 in Ceiling	—	1 layer	10	A
90. Ins 3 in Ceiling, between joists and below rafters		3 layers	0	A
91. Ins 3 between joists and below rafters	—	2 layers	2	A
92. Ins. 4 in Ceiling	—	1½″	3	A
93. Ins 4 in Ceiling	—	2″	0	A
2. Finished Ceiling with 1″ Y. P. Attic Flooring				
94. No Insulation	—	—	9	A
95. Ins. 5 in Ceiling	—	1″	2	A
96. Ins. 1 in Ceiling	—	3⅝″	0	A
97. Ins 2 in Ceiling	—	3⅝″	00	A
98. Ins 3 in Ceiling	—	1 layer	5	A
99. Ins 3 between Joists and below rafters	—	2 layers	00	A
100. Ins 4 in Ceiling	—	1½″	0	A

Abbreviations

F. Furring
L. Lath
P. Plaster (Ground & Finish Coats)
Sh. Sheathing
St. Studding
Y.P. Yellow Pine
H.W. Hard Wood
Ins 1. Porous Insulating Concrete
Ins 2. Powdered Gypsum Mixture
Ins 3. Pressed Fibre Board
Ins 4. Compressed Cork in Board Form
Ins 5. Wood or Fibrous Felt Contained in Paper
Values apply to following Roofing Materials
1. Wood Shingles or Strips
2. Rigid Asphalt or Asbestos Shingles
3. Composition Roofing
4. Slate or Tile with Roofing Felt on Wood Sheathing.

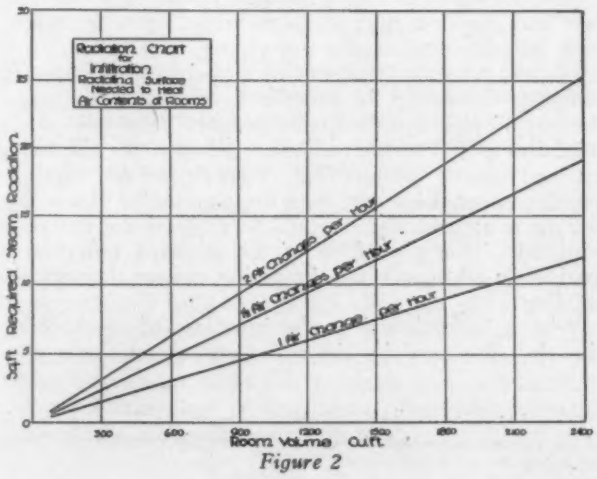

Radiation Chart for Infiltration
Radiating Surface Needed to Heat Air Contents of Rooms
Sq.ft. Required Steam Radiation
Room Volume Cu.ft.
2 Air Changes per Hour
1 Air Changes per Hour

Figure 2

If another system is to be installed the area of the required radiation is equal to the ratio of the heat emission from the types of radiators multiplied by the equivalent steam radiation found by calculation.* These ratios are as follows:

Ratios of Heat Emission to Direct Steam Radiation

Hot Water	1.6
Vapor	1.15
Vacuum	1.0
Warm Air (1st fl.)	2.2
(2nd fl.)	1.5
(3rd fl.)	1.2

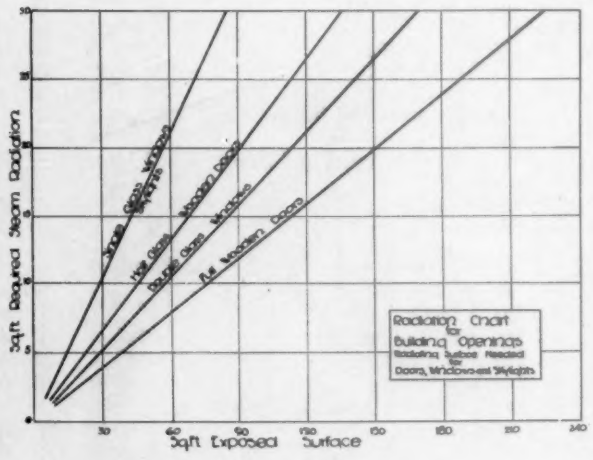


Figure 3

Determination of Boiler Size

Gas Boilers are rated on the actual quantity of heat which can be developed by the boiler and distributed to the radiating system. In making a selection of the boiler size from the heat loss of the building, there must be a number of definite and well-known allowances made to give the boiler a sufficient safety factor for meeting any unexpected demands of the weather, also to cover usual construction and installation requirements of the heating system.

The heating system includes, in addition to the radiators, a certain amount of piping. When the boiler starts to supply heat to the system this pipe must be raised to the proper temperature to overcome condensation which takes place. Piping also serves as radiating surface and gives off heat to the building. It is necessary, then, to add an allowance for piping, usually known as risers and returns, to offset this added load of radiating surface. Where it is possible to measure the actual amount of pipe installed, this amount should be calculated and added to the radiation required for offsetting the heat loss of the building. Experience and common practice show, however, that the amount of risers and returns is approximately equal to 25% of the radiation required. Therefore 25% of the required radiation is used as an allowance for the piping system through the building.

With a boiler based on the heat loss of the building plus the allowance for the risers and returns, it is possible to maintain the temperature of the building at the proper point, after it has reached this temperature. However, in raising the temperature of a house after an over-night shut down, or when a severe cold spell occurs very suddenly, there would be insufficient boiler capacity to raise the temperature of the walls and the interior of the building within a reasonable length of time.

It is also found to be good practice to have the boiler or furnace operate only a part of the day rather than do continuous duty. Here again experience shows that an allowance of 25% of the capacity necessary for the radiation required in the building and the allowance for piping gives the best operating conditions for steam, hot water, or vapor system. In determining the boiler size, therefore, from the heat loss or required radiation of the building, 25% of the required radiation is added as an allowance for risers and returns, or, where possible, the actual surface of risers and returns added, and an additional 25% of this combined total is used for the starting load.

Boiler Tax for Special Temperatures

Radiators installed in rooms in which the temperature is kept at points other than 70° subject the heating plant to different conditions from those where the rooms are all kept at 70°. Obviously the return water to a boiler from radiators in a room heating to 50°F. will be at a lower temperature than the returns from a room in which the temperature is 70°. The return water needs, therefore, a greater heat input to again convert it to a point where it will give a suitable heat emission from the radiators. This extra load is known as boiler tax. The boiler tax for radiators operating at different temperatures is given in the table below.

Boiler Tax for Different Temperatures

Temperature of Air Surrounding Radiator	Multiplier
50°F	1.16
55	1.12
60	1.08
65	1.04
70	1.00
75	.97
80	.93

Boiler Tax for Different Types of Radiation

The values previously given are for the standard column wall radiation or vertical pipe coil radiation. There are, however, other types of radiators, some of which are becoming popular. The more important of these are standard indirect type, the standard indirect recirculating type, the direct indirect type and the Vento indirect recirculating type. The two latter are being used to an increasing amount for very large installations, but the three former are gradually disappearing. In these types of radiation cold air is normally taken from outside the building and a greater radiating surface used to heat air to proper temperatures. In addition, the condensing effect of this cold air is greater and the factor for boiler tax must be increased to allow for this condensing effect. However, the location of the radiators is generally closer to the boiler and therefore the allowance for risers and returns and starting load is considerably less than in the normal types of radiation. In dealing with the Vento

** For hot water, vapor and vacuum systems, the areas are in sq. ft. of cast iron radiation. For warm air systems the areas are in sq. in. of basement duct cross section.*

Type	Required Radiation	Boiler Tax Multiplier	Allowance for Riser and Returns	Starting Load	Boiler Size*
Standard Column	1.00	1.00	25%	25%	1.56
Standard Indirect	1.20	1.70	10%	10%	2.46
Standard Indirect-Recirculating	1.10	1.30	10%	15%	1.81
Direct Indirect	1.10	1.20	25%	20%	1.98
Vento Indirect	1.20	2.00	10%	10%	2.90
Vento Indirect-Recirculating	1.00	1.60	10%	15%	2.02

systems, it is urged that reference be made directly to the Vento hand book, although the data which is given in the table above is in all respects accurate for this type of equipment.

* The boiler size is obtained by multiplying the required column radiation by the factor for the system used under this heading. For example, a building requiring 1000 sq. ft. of column radiation would need a boiler at least 1560 sq. ft. rating for standard column radiators, 2460 sq. ft. for standard indirect radiators, etc.

The totals of all the rooms as modified by special boiler tax are then used to select the roper gas coiler.

For buildings having more than 2000 sq. ft. equivalent C. I. R. the amount of piping per unit of radiation decreases. At the same time the diversity factor for heating changes. For these reasons, other allowances are made for the combined starting load and piping. These allowances are tabulated below as a recommendation of the American Gas Association.

Radiation Load	Selection Factor
Up to 500	.56
1000	.523
1500	.486
2000	.45
2500	.437
3000	.424
3500	.412
Over 4000	.40

Warm Air Furnace Selection

In determining the furnace size for a warm air system, no allowance should be made for risers and returns but 30% should be added for starting load. As some of the furnaces are not rated according to the Code of the National Warm Air Heating and Ventilating Association in terms of cross sectional basement duct area, an alternate method is recommended on the basis of gas burning capacity. This is obtained by adding 30% to the B.T.U. loss of the building and dividing by the efficiency of the furnace (assumed as 70%) and the heating value of the gas. This is expressed by the equation

$$\text{Furnace Size (Gas Cons.)} = \frac{\text{Heat Loss (B.T.U.)} \times 1.3}{.7 \times \text{heating value of gas}}$$

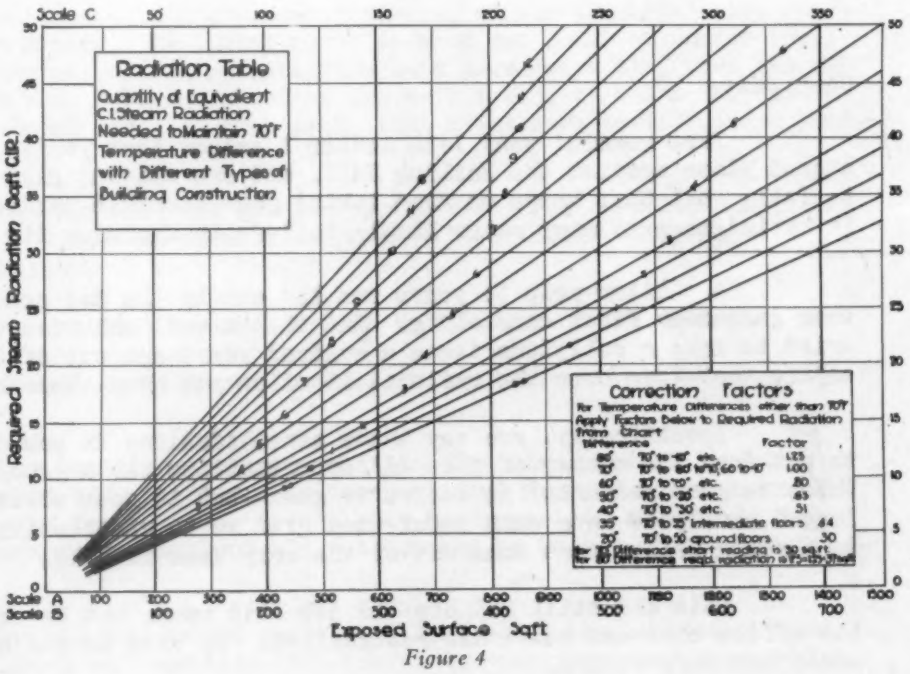

Scale C
Radiation Table
Quantity of Equivalent C.I. Steam Radiation Needed to Maintain 70°F Temperature Difference with Different Types of Building Construction
Correction Factors
Required Steam Radiation (Sq.ft. CIR.)
Scale A
Scale B
Exposed Surface Sq.ft.

Figure 4

or simplified:

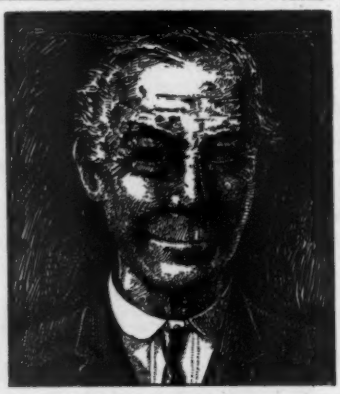
$$= \frac{\text{Heat Loss (B.T.U.)} \times 1.86}{\text{Heating value of gas}}$$

The capacity of the boiler or furnace calculated in this way is then compared with the manufacturer's catalog and the size equal to this value, or next size larger, is selected as the correct boiler size.

(Continued in September issue)

Official figures of Canadian natural gas production, commercially utilized, for March, 1930, show a total of 3,016,480 thousand cubic feet for all Canadian fields. This represents 11 per cent increase over March, 1929. New Brunswick and Ontario totals were practically unchanged from last year, Alberta production accounting for almost the entire increase.

Letters from a Gas House Terrier to His Grandson



Copyrighted 1930, American Gas Journal

Dear Sam:

From readin' your last letter I gather that you've done picked out a good place against the Wailing Wall, and are waitin' gloomily for the ax to fall. All that keeps me from takin' your turrible perdickament seriously is havin' seen so many other likely fellers in the same fix in the past.

A similar yelp to yourn was let out by the Bow and Arrer Makers Union when gunpowder first come along. And the ox-cart chauffeurs Local Number 846 tried to make a relijious issue a hundred years ago out of the first steam enjine that tore over the rails at 18 miles per hour—some hours.

Specifically, you say these consolidations in gas companies is bound to cut down the number of jobs an' oppertunities for a young feller in the field. Which is good reasonin' as far as it goes—but it goes about as far as a one-legged paralytic in a sack race. And gits me to ricollectin' not so long back to a young feller that come out of the army back in 1919.

This kid still had his old job held open, but he only called by to get his office coat and leave his resignation. He said he had another job with less money and more future.

Came a day, as the dumbies used to say, when they made the kid a department manager in the new bus'ness. Which is where some fellers would settle down to gittin' ready for a comfortable old age.

But this youngster was diff'rent. First thing he does is to start in gittin' rid of useless people and useless work around his new department. And next thing anybody knew he didn't have no department! He had abolished himself plumb out of a job!

Of course, naturally, after that there wasn't nothin' to do but give him a better one. And last I heard, he'd doggone' near schemed himself out of that one too; until they was talkin' about makin' a vice president out of him.

What I'm drivin' at, son, gas companies aint no diff'rent from any other bus'ness house. When times gets a bit cramped, they keep the good ones an' thank God for the chance to can the other kind. And, while a good man occasionally connects with a boot in the' pants durin' these readjustments, his old company's loss is gen'rally one of their competitor's gains when the smoke has blew away. All that bus'ness depression really does, usually, is give a little extra down-hill push to fellers that was already on the terboggan anyhow.

I see, too, you have joined feebly in th' current holler about possible change-overs from manufactured to natural gas. For which condition I reckymend by-carbonate of sody, follered by fifteen minutes brisk settin'-up exercises for the territory between the ears. Why, Sam, to listen to some of these old-timers around a manufactured-gas outfit squawk, you'd think that the one thing that disqualified a man for any job higher'n office-boy in a system distributin' natural gas was to know somethin' about gas! Manufactured gas, that is.

Them boys ain't afraid of natural gas, they're afraid of change. Which is somethin' that can't possibly consarn a young up-and-comer like yourself. For the next hundred year or so, you nor nobody else can afford to go down town to work in th' mornin' without two things bein' wide open—your eyes an' your mind. For changes is comin', and it's the young feller like you that'll be ready for 'em—ready to harness 'em instead of fightin' 'em.

Now, Sam, barrin' a skunk in a perfume store, they ain't nothin' more unpop-'lar than a back-seat driver. So I aint goin' to hand out a lot of advice now. But they was one youngster come to my attention back some years ago, when gas men was jest beginnin' to come down again out of the tall trees, to which they had fled from them early model sizzlin' blue arcs, that might have somebearin'on your situwation.

In them days times was hard and gas men was harder. But this lad had picked out the gas bus'ness for his bus'ness, and couldn't be bothered with the boss sayin' no to his selection.

They told him the gas bus'ness was gone to hell an' wouldn't be back.

The kid said he'd stick around and wash a few ink wells while they was waitin' for the hearse.

They told him they wasn't no salary authorized for him—somethin' that causes these here modern kids to tear down doors gittin' away from the accursed spot. But this one come back that he didn't know beginners <u>got</u> salaries! And, anyway, it was too soon to think about his yet because he hadn't stated his proposition.

When he did, four old-timers and one time-killer had to be carried out and given first-aid for shock and vertigo. (But two of 'em was game, and are workin' for the kid now—he has 'em on his yacht for dinner with him, too, every time he comes to their town.)

In brief, the only way this boy would work was for nothin'. For five weeks, that was. At the end of that time the gas company would decide whether he got fired without no pay or got hired at the figger he had showed 'em he was worth.

Now I aint preachin', but a little more of that raw-beef an' blood-gravy sperrit, Sam, is what <u>some</u> young fellers in the gas bus'ness (not callin' no names!) needs today. It's the one guarn'teed preventive for worry over consolidations, natural gas, and the alleged increase in Czechoslovakian exports of wormholes!

Yours for more gas an' less Gassin', *Monoxide Mike*

Merchandising Views and Reviews

FIFTY Million Chinamen can't be wrong; "A picture is worth a million words,"—that's why more gas men should undertake to show by pictures the use of gas appliances when they build window display advertisements. And more and more of them are doing just that thing. Do not think that your idea of a window display setting or background is "not so good" just because it is yours. Assume that you are good and build up your idea;

put it in your window and if it is "not so good," you will soon know it from the passer-by attention and comment it secures.

A GAS man we ran across the other day told us that one of the best summer sales he had ever conducted featured the cool kitchen idea. This man built all of his advertising around the cool kitchen and offered a portable kitchen ventilating fan with each insulated range purchased during a period of thirty days. When prices were quoted they included the fan. This was done to get away from the idea of a premium, for as this man said; "You might just as well let folks know that they are paying for all they get at the outset. We do not give anything free with the merchandise we sell, we simply offer two items at a special price for a limited period of time, to introduce the appliance featured."

THE reason business is bad for some merchants may be attributed to the fact that they are like a certain Georgia cracker who was over cautious. As the story is told; this fellow who sat, barefooted, on the steps of his tumbledown shack, smoking a corncob pipe, was approached by a stranger who asked for a drink of water and wishing to be agreeable said; "How is your cotton coming on?"

"Ain't got none," said the cracker.

"Didn't you plant any," asked the stranger.

"Nope," said the cracker, "fraid o' boll weevils."

"Well," said the stranger, "how is your corn?"

"Didn't plant none," said the cracker, "fraid there wasn't goin' to be no rain."

The stranger was abashed, but cheerful still. "Well, how are your potatoes?"

"Ain't got none; scairt o' potato bugs."

"Really, what did you plant?" asked the stranger.

"Nothin,'" said the cracker, "I jest played safe."

Many dealers who are playing safe and failing to keep up their stocks and sales efforts are letting business walk right out their stores every day.

LOOK at the refrigerator advertisement reproduced on this page—ten words and an illustration drive home one of the many reasons why any one in the market for a refrigerator should consider the gas refrigerator. Someone has said; "Eyes remember when ears forget," and that is just why this advertisement is a good one.

HARRY TABLER of American Ace fame has chalked up another good record by working out a plan that sold one hundred and sixty-six storage water heaters on a group of properties having but two thousand gas meters. This sale according to Mr. Tabler was conducted on the properties of the Kansas Pipe Line and Gas Company, and the material used was a special direct mail campaign which was closely followed-up by the company's salesmen. We understand from Mr. Tabler that these properties now have installed over eight hundred storage type gas water heaters, which is a very good percentage by meter. This information bears out our contention that where direct advertising is used on picked lists and closely followed-up by salesmen, water heaters, or any other appliance for that matter, can and will be sold.

INSULATED gas ranges seem to be having a run these days, and while there is the usual argument pro and con as to this type of oven those gas men who have really gotten behind the insulated oven are said to be doing a good job. Others are said to be worrying about the loss of revenue from this type of oven. As we view it, the gas man who sells an insulated oven range and then sets about to check-up on the loss of revenue is in for a big surprise—we are of the opinion that he will find that in making the kitchen a cooler work shop he has materially added to the usefulness of the range; that the woman who owns this type of range now truly enjoys cooking and does more of it. Hence the revenue is built up rather than decreased. Folks do enjoy cooking in cool kitchens.

WE have heard a lot about chain store window displays that sell the customer, yet we don't remember of hearing just *how* the thing is accomplished or how the dealer in gas appliances may cash-in on it. Woolworth don't ask you to buy, yet at every hand he entices you by exposing his wares for sale. That, it would seem, is the big idea back of the average chain store window display; exposing wares for sale, priced at prices that folks have come to believe are very low. The windows of the chain store, like those of any other retailer, afford what may be said to be the dealers' first opportunity to convert a "looker" into a buyer. The modern merchant, knowing this, does his best to cause his windows to arrest attention, to stop the potential purchaser, to create desire or an urge to enter the store, to see and heft the merchandise. And while the Woolworth folks and other chain operators do not ask you to buy, they make it very convenient for you to buy not only what you came into the store to *see* but other items of merchandise that you may *need*.

This is accomplished by the open display method, plainly pricing of all items, and a system that places kindred items side by side.

The window display may be given cred-

it for a large per cent of the chain store sales. So we would say that the chain store man like other modern merchants plans his display with the hope that they will attract folks into the store. Also, chain stores deal in what may be said to be staples, parts and small items, and for that reason and the reason that the number of items frequently run into the thousands, they must display many items and many different items at a time. This is also true of "independent" dealers carrying many staple items such as hardware, electrical table appliances, or novelties, while the specialty dealer has a far different problem. The average specialty is priced from $5.00 up; therefore, the window display of the specialty dealer presents an entirely different problem, although the display is constructed for the same purpose as that of other dealers; to attract people into his store.

The window displays of such a dealer need special treatment. In other words, they must be so designed that they register instantly any message that he may desire to convey. To do this convincingly the display must be built around a single dominating appliance or feature that may be flashed at the potential purchaser as he hastens past the store. This must be done in a manner that will say: "Stop and get this idea of what this what-not will do for you."

Specialties are purchased as a rule only after the purchaser has done considerable shopping, talking and premeditating. Therefore, it is not reasonable to expect that methods that sell or further the sale of low price range staples would fit into the sale of such high class specialties as continuous flow gas water heaters, home heating boilers, clothes dryers, refrigerators, gas ranges, radiant heaters, incinerators or gas ranges.

On the other hand, if the specialty dealer can employ a special low down-payment, a worth while premium or an extended plan, for a limited period, any of these or other things may be used as a dominating feature in connection with the specialty dealer's window and enable him to trace results.

As we view the matter of window display advertising as applied to the sale of gas appliances, we are of the opinion that the man responsible for displays will do well if he models his displays after the suggestions offered by the American Gas Association. If, on the other hand, the old cash drawer can't be induced to cough-up from fifteen to forty-five dollars per the display, for the material necessary to build this type of display, displays built around material supplied by manufacturers of appliances may be used. In building displays of any sort there are a few fundamentals that must be observed if the display is to be effective. Windows must be thoroughly clean and bright, well lighted, and the merchandise selected for display must be spick and span. If drapes and back-drops are to be a part of the display, care should be taken to see that the colors of the materials used blend harmoniously with the merchandise displayed. Cool colors, such as greens, blues and white should be used during the hot months, while warm colors, such as yellow, orange and red should be used during the cooler periods of the year. Browns, dark greens and reds are sometimes used effectively in connection with autumn displays of radiant heaters, while greens, reds and white are used in combination during the holiday season.

TO Norman B. Terry and R. L. Lewis of the Laclede Gas Light Company, St. Louis, goes another medal for creating another human interest advertisement. This time they have directed their appeal to the home manager in a semi-humorous manner that leads her right through a bunch of old jinxes and right down to a logical reason why she should cook her meals on a modern gas range. The advertisement is so generous in its use of white space that it is bound to secure reader attention even though the make-up man might be so unsympathetic as to put it on the Sports Page of a metropolitan daily newspaper. It is good to note that gas men here and there have at last concluded that a little humor and human interest in their advertising begets attention and helps to sell gas appliances and gas service.

You can walk
under ladders
smash
mirrors
let black
cats cross
your path
and *still* have good luck with your cooking and cake baking if you use a Quick Meal gas range.
Measured and regulated heat is the secret.
The Lorain oven heat regulator practically insures good cooking.
Stop in and see how these ranges operate.
The LACLEDE
Gas Light Company
Olive at Eleventh Central 3800
3524 N. Grand 3189 S. Grand 2744 Cherokee
(3 blocks south of Arsenal)

A MAN who has made a remarkable success in selling gas incinerators says that it is entirely due to the fact that he knows who he wants to sell before he actually gets into sales-action. This man's story is; "There is no secret to our success in selling incinerators. We simply do the obvious thing; we survey our market for potential users and build-up a list that we concentrate on. This list is comprised of representative citizens, folks that we know are anxious to be modern and possess modern home equipment living in homes that cost from $10,000 up and homes that are users of gas or oil for heating. We know from past experience that if we consistently tell these folks what gas incineration is worth to them we will eventually sell them.

"The list is made up on cards which give a running history of what has been done to interest and sell each customer, what mailings have been sent him and what his reaction to our personal follow-up has been. All cards are considered alive until the customer has been sold and one or more calls have been made after the incinerator has been installed, to be sure that all is satisfactory and to secure the names of any friends that the user thinks might be interested in gas incineration. In sending out letters and mailing pieces we avoid any reference to cost of installation, cost of operation, or mechanical details; this information is supplied by the salesman at the time of his call. We are of the opinion that in this way we have a better opportunity to combat any resistance that may exist in the mind of the customer, by pointing out just what gas incineration of garbage and refuse means to his home."

THE gas man who is seeking new ideas to use in connection with radiant gas heater advertising and window display advertising will do well to secure a copy of the Humphrey Company's 1930 mat book. This book contains a number of complete newspaper advertisements, a group of cuts furnished the gas man and a number of very effective window display advertisements. Aside from this, Humphrey helps this year include a number of fine mailing pieces and booklets in color.

Is this your wife?

It's 5:30 again. Once more the evening meal is under way. Outside the temperature is 95. Inside the kitchen it is 100. Already pictures on the wall are swimming in a dizzy whirl.

Day after day does your wife take this punishment? Does she serve the food for you, but have no appetite, no relish, for any for herself? Has she changed from the happy, energetic girl of "love, honor and obey" days to a tired, wilted kitchen slave? Is every step a forced one? Is every minute spent in the kitchen like a sentence to some kind of inferno?

If you wish it, her kitchen hours may be cool and pleasant. Instead of four to six hours a day over a slow, hot, musty, room-heating kitchen stove, only two or three hours are needed. And the food is cooked better, more appetizingly. In cities, gas cookery has freed 15,000,000 women from hot, wilting kitchen drudgery. Why should there be a penalty for living beyond the gas mains?

Now Skelgas, the compressed natural gas, brings freedom to women who live beyond the gas mains. And thousands of women each month learn this new enjoyment of life. For thousands are discarding obsolete cookery methods to change to the speediest, cleanest fuel, which is at the same time the coolest; with all heat concentrated on the vessel itself. Skelgas cooks the food without cooking the cook.

What is the cost of Skelgas fuel? About one-fifteenth as much as the upkeep cost on the average motor car. Are monthly payments available? Yes, during July a down payment of only $12.50 completely installs a Skelgas outfit, including choice of five new stoves, the "gas plant" itself and even many months supply of Skelgas fuel—everything. Small monthly payments follow over a twelve-month period.

For only $12.50 down you have ready to use a convenience which banishes kitchen drudgery three times a day, 1095 times a year. Which cuts kitchen hours in half. Which makes the kitchen as liveable a room as any in the house. Which does not soot up the kitchen vessels or kitchen walls. Which makes any kitchen, anywhere, as modern as a city kitchen.

Husbands, have you ever before had the opportunity to do so much with so little: only $12.50 down? If you do not know your Skelgas dealer's name, write the nearest zone office of Skelgas Utility Division of Skelly Oil Company: at 6190 Delmar Boulevard, St. Louis, Missouri.

ON a day when the thermometer races up to 102 degrees, it takes an unusual advertisement to move us. The thing happened however when we uncovered the Skelgas ad we are submitting herewith. Here is an advertisement that does a lot of things that we have often wondered why the old-line gas company advertising man has not done long, long ago.

This advertisement is so different that we are of the opinion that it hit a lot of folks, just like it did us, right between the eyes and led 'em on to reading without a thought that it had to do with cooking. Look it over and read that about "love, honor and obey" and "about one-fifteenth as much as the upkeep cost on the average motor car." Here is an advertisement that has been written by a man who was not too close to the gas business and who could put in that "what it will do for the Managing-Director of the home, she who pulls the purse strings."

MORE and more gas companies are advertising gas house heating during the summer months. And a house heating engineer tells us that he has made more estimates this year than at any time during the six years that he has been selling gas house heating. Aside from making estimates, this man says that this year's advertising is developing hundreds of prospective customers for next year and the next. People who have delayed building due to one reason or another are planning to install gas furnaces and boilers when they do build.

This man gives the following as the reason for the added interest in gas house heating: "Advertising being done by the manufacturers of house heating furnaces and boilers as well as gas companies has aroused the interest of everyone who owns a home. Also, the vast extensions made by both the manufactured and natural gas companies in reaching more people has in a big way promoted the idea of using gas for home heating. More people are hearing more talk about the gas industry this year than ever before and naturally think about ways and means to convert this clean fuel to their own use."

HOUSE-to-house searching for prospective purchasers and sales is not the easiest method of getting business, but it is the most certain. This is an ideal time to knock doors. Women are not shopping around during dog-days, yet they may be found at home and willing to be interested in home appliances that will help them with home work. Remember this: there is no better time than when the sun-shines to make sales. From the time you read this until the September issue of *The American Gas Journal* is in your hands, you've some mightly likely prospects in your territory for gas laundry equipment; laundry stoves, gas heated ironers and clothes dryers. Laundry becomes an urgent problem when the school bells begin to ring.

Canvass is the key that will open up a surprising lot of sales for the fellow who will use it regularly, daily, in connection with his calls on the live prospect. The more canvassing a fellow does the more live prospects he will have to call on, and the less canvassing. Think this over.

SELLING will sell and dispel, what for many is, a state of mind; "that business is bad." This we would say is the idea back of a line used by Standard Home Utilities, Chicago dealers in gas ranges and other home appliances. In advertising a July Special Gas Range this company ran a slug at the bottom of their newspaper advertisements which read; "Buy Something from Somebody—We All Prosper Together." This, as Andrew Brown, of Fresh-Air Taxi Cab fame,

would say, may prove to be good *psyrology*.

P. W. Hopkins, Advertising Manager for Roper of Rockford, says; "Speaking of business being bad, there are a greater number of our customers who are contemplating running Roper Range Sales in August and September than last year. Let the fellows who are bewailing the fact that there is no business laugh that off." Having seen the new *Art in Gas Ranges* we are not at all surprised at that—and speaking of plans, merchandise, etc., etc., another plan that comes to the gas man, who is convinced that selling will sell, is the August "Round-up Sale" plan offered by the Humphrey Water Heater folks of Kalamazoo. Their plan is one that if taken as prescribed will offset the tendency to let-down sales and prospect hunting during the hottest months of the year and build-up sales at a time when it is the natural tendency to take things easy. The desire for leisure, comfort, and convenience is the very strongest selling point you have to offer. It is the very essence of your appeal to your prospect to enjoy the comforts and conveniences that an automatic gas water heater will afford them.

Now's the time to tell the customer what gas hot water service means to him, his comfort, health and happiness. Aside from what range and water heater manufacturers are doing to promote dealer activities we find that no less than three incinerator manufacturers are right on the job with plans that are worth considering right now in order that you may be all set for National Fire Prevention Week.

Domestic Utilization of Gas

L. W. GASKELL

Michigan Gas & Electric Co., Niles, Michigan

THERE has been much discussion in the past concerning the laxness of the gas industry relative to proper growth in comparison with other utilities, particularly the electric. We will admit that possibly in the dim past that may have been true. However, I believe the following figures will show that we are now very much awake to the present and future possibilities of marketing our product.

Production and sales of gas by the utilities of the state doubled during the past seven years largely keeping pace with the production and sales of electricity. Last year, 1929, gas sales in the state reached a new high peak of approximately 38,000,000,000 cubic feet. Back in 1922, they were 18,633,376,000 cubic feet. The gas utilities made this astonishing progress in the midst of a revolutionary change in the character of the utilization of their product. Only a few years ago 90% of the gas produced in Michigan was used for lighting. Today more than 92% is used for heating. And in changing its function from lighting agent to heating agent, gas entered upon a field of opportunity far greater than was dreamed by the pioneers of the industry. In Michigan it is continually growing richer and promises to extensively develop in the future.

Approximately 70% of the gas consumed in Michigan in 1929 was used for domestic purposes, 28% was used for industrial, commercial and miscellaneous purposes; 2% was used for house heating. In 1929, domestic sales of Michigan gas utilities grew approximately 8.5% over 1928; house heating sales grew 56.5% and industrial and commercial sales grew 16%. In actual volume the greatest growth was in domestic sales.

Presented at the Thirty-eighth Annual Meeting, Michigan Gas Association, June 30, July 1, 2, 1930, Mackinac Island.

As the subject of this paper is "Domestic Utilization of Gas," I will dwell but briefly on the possibilities of increased business in the gas utility as a whole, but on that part which affects the masses of people who are now or will be everyday consumers of our product.

The field for industrial development is large and offers fertile pasture for concentrated outlets in large volumes. This phase of our business is being promoted in all active companies and is resulting in very gratifying returns. The accuracy in the control of gas heat, has made it very popular in the baking of molding cores, the melting of metals and the application of various enamels and paints.

House-heating with gas is extending so rapidly in Michigan that during the first quarter of 1930 it ranked first in percentage of increase among the sources of "New Business" of the gas companies of the state, reports the Michigan Public Utility Information Bureau. The number of customers using manufactured gas to heat their houses on March 31 was 1,331. a gain or 31.2% over the number served by Michigan companies on March 31, 1929. Gas sales for house-heating during the first quarter were 20.8% greater than for the corresponding quarter in 1929. From almost the zero mark five years ago, gas heating sales have grown to more than 4½% of all sales of manufactured gas made by Michigan companies furnishing 93% of the state's supply.

We will now proceed to the domestic consumers where exists the problem of securing additional income on a normal, profitable basis, and not by additional expenditures which if extravagant, endanger our ultimate prosperity. It is of course very essential to extend our service wherever the estimated future revenue will warrant it, but our main endeavor is to increase our income on existing investment.

How can we best go about it to get this much desired condition? In my opinion and I expect it is more or less general, an accelerated program of intensified sales and promotion work, resulting in gas appliance sales must start immediately and be given undivided attention by its sponsors.

Cooking, water heating, refrigeration, space heating, and incineration bring to us the immediate field for our operations. The percentage of homes which are equipped with all these appliances, is very small, so that our entire customer list are prospective buyers.

Gas cooking must be considered as a very important part of our work as it is the modern gas range which protects us from the exclusion of the use of gas in the home. With its existence the first objective is gained. The insulating of ovens and the automatic control have made gas ranges obsolete which have been purchased longer than four or five years ago. We must then consider our gas range situation as dating from that time. There are many ways by which we may encourage more home cooking and baking. Cooking schools, Home Service Departments, and similar educational methods, have been put into operation in many companies with very good results. The routine of preparing daily meals becomes monotonous and new methods or additions to the menus which we may offer, will tend to lessen the trips to the delicatessen store.

The dissatisfied user of gas invariably is trying to compete with modern cooking programs with an obsolete, inefficient appliance. When such a condition exists the housewife is very receptive to the discussion of other cooking fuels and our income is more or less in jeopardy. We win this consumer back to the fold by replacement with modern equipment.

Next is the heating of water and the perfect refrigeration of food on an economic basis. In these two appliances lie our load building possibilities, and I believe I have named them in their succession of entrance to the home. All of you are familiar with the approximate increase in dollars and cents in revenue by their use, that is a natural result. Our job is one of proper presentation to secure sales. We have spent too much time worrying over how best to persuade our customers to agree to the additional expenditure necessary for possession. We should have seen that this is not the obstacle, by observation of the success of the automobile and radio industry. Automatic water heating and gas refrigeration should be the most enjoyed convenience in the home. It is not, only because of not having been experienced. Ownership is the offspring of desire—therefore it is our job to so present our wares to the layman that he may be absolutely discontented to be without them.

Gas house heating is now developing

to a point where speculation as to its universal use in an economic sense is practically vanished and there remains the usual routine of presentation and the successive steps necessary for its adoption by the public; due to the very nature of its load factor it is very desirable business and is receiving widespread activity in all gas companies with gratifying results.

A perfect sales organization is our first need. We must hire and train men to sell our merchandise and to sell it in such a way as to inspire confidence in the company for which they work, and to insure continued use of the appliance. There is no set rule for this procedure as each sales executive must proceed on a plan most acceptable to his community. In order to do away with excessive salesman turnover, much thought and careful consideration must be given to the best method of paying them. Do not handicap them by excessive salaries, nor of course by inadequate ones, control their working hours and their routine duties by a stipulated amount and the balance of their compensation through commissions or bonuses on sales resulting from their ability to correctly present our merchandise and cause it to be accepted. The sales personnel must be of good character and entirely trustworthy and if possible their past employment record should be investigated. In a good many cases the salesman is the only contact which we may have with our customers so as he is received and treated, so is our company. Public confidence is the secret of successful public utility operation and if our representatives do not inspire this confidence in our customers we suffer very materially.

Perfect Team Work Necessary

There is one more thought in this connection which is very important. In order to have perfect selling organization function properly, perfect harmony must exist between the sales manager or supervisor and his executive. Perfect team work cannot help but result in increased sales.

The next connecting link to our plan is the best of co-operation between the other departments in the prompt and careful installation of appliances sold. Too many days of real work on the salesman's part are sometimes lost by an existing friction or indifference on the part of an uninterested service man. Every employee of our companies should be made to realize that they must lend all possible assistance to the Merchandise Department and to guard against any internal friction which might hinder its smooth operation.

The men who represent us in the customer's home on service or complaint calls have us more or less at their mercy and it is always possible that they may, through undiplomatic suggestions, lead the customer to be over critical in his or her demands upon our service. It is then again essential that we give them the same careful attention not only in their selection, but also to give to them the opportunity of educating themselves in the most successful method of employee contact. Their acceptance by the public reflects itself as one of the governing factors towards the furtherance of our companies' good will. Let us give to this problem our most careful consideration.

We now come to the cost of our fuel to the consumer. During the life of the gas industry and with but few exceptions, there has been a gradual decrease in the price of our product. The consumer has learned through years of experience in purchasing his various needs, that he must pay a fair price for any service well rendered and I think that our industry has the utmost confidence of the public in this respect.

Were we to trace down the few complaints which are received on our rate structure we would invariably find the real cause in some failure on our part in rendering acceptable service.

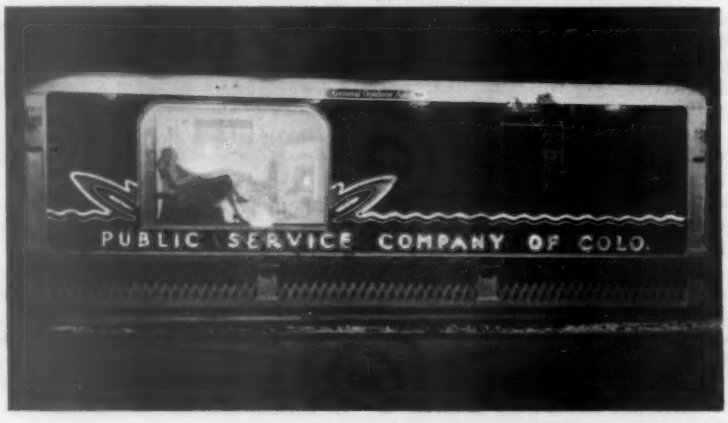
The old method of price per thousand cubic feet regardless of the volume used, is rapidly becoming extinct. It is a fact that our product takes its place with other materials which are purchased at a price, varying with the volume contracted for. Our optional and step rates are accomplishing their purpose and we are constantly enjoying a gradual increase in gas output.

I am very proud to be working for the utility interests and wish to conclude my paper with the following thought:

The word "utility" in an economic sense means "the power to supply human wants." We have this power so let's wield with careful hand and in return we will not only receive material gain but also we will derive a certain pride in the knowledge of a service well rendered.

Forestalling A Rush in September Heating Jobs

PAULINE SLAUGHTER



Night picture of one of the "Heat with Gas" Signboards

IN September of 1929, the Public Service Company of Colorado in Denver received eleven hundred and thirty orders for house heating equipment!

A year after natural gas was put into the mains of Denver a striking full-page advertisement was placed in the newspapers to the effect that for the month of September gas could be installed in furnaces for the special price of $100.00, easy payment plan.

The specific result from this advertisement was spectacular. A torrent of orders poured in all through the month of September which totaled 1130. The not unusual rain, cold, wind and snow of a Denver September came early in the month. People were frantic to have their orders filled and of course there was much discomfort, inconvenience and delay. So the Public Service Company decided to launch their 1930 campaign in June.

This campaign has been begun by erecting thirty-six signboards twenty-four painted ones and twelve electric, carrying the legend of gas heating.

The Denver public is being told of a most unusual plan. One may buy a gas heating equipment now no payment down and start paying next October. This equipment will be carefully and expertly planned to suit his individual needs, it will be installed at leisure during the summer months when there will be no discomfort from open doors and messy workmen. Absolutely no charge will be made until the first of October. At that time the first payment will be asked for and the balance may be paid in easy installments.

(*Continued on page 69*)

It Is a GOOD Gas Range That Has This Red Wheel

Patents Pending

TIFFIN model CASH PRICE $99.75 ($112.75 West of the Rockies)

Patents Pending

PATRICIAN model CASH PRICE $195.00 ($210 West of the Rockies)

A New Magic Chef Model at an Attractive Moderate Price

SOMETHING we have always wished for but thought it couldn't be produced!" That's what dealers who have seen the new TIFFIN Model say about this new member of the Magic Chef family.

Priced under $100, this new Magic Chef, in a more compact and convenient size, brings Magic Chef charm and style within reach of thousands of women who could not afford the larger models.

The September 20th issue of the Saturday Evening Post will carry a double page advertisement, in full color, of the Tiffin Model. Page advertisements in color in other leading magazines just before and after the Post announcement will attract wide-spread interest to this remarkable gas range achievement.

Tie up your store to this important national advertising to get your full share of the substantial demand that will be created for the Tiffin Model of the Magic Chef. There is nothing in the gas range field today that can match it at the price. It will pay you to get full details.

Send name and address for free copy of booklet showing modern kitchens.

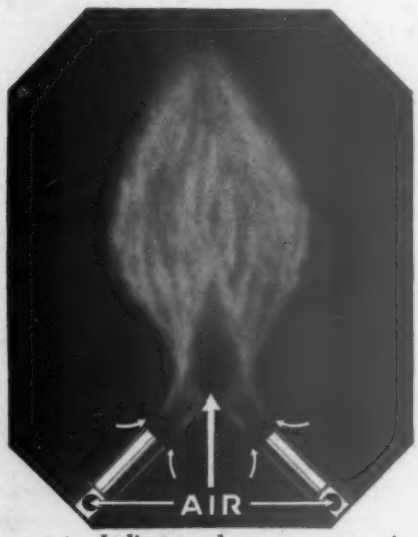
Magic Chef

AMERICAN STOVE COMPANY . . . DEPT. B, 801 CHOUTEAU AVENUE, ST. LOUIS, MO.

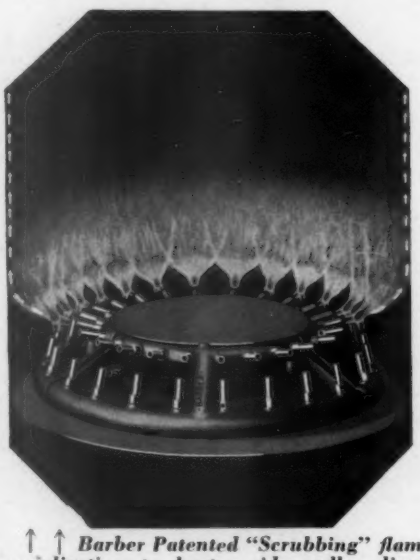
LARGEST MAKERS OF GAS RANGES IN THE WORLD

THE DUAL REQUIREMENT OF EFFICIENT GAS HEATNG

MAXIMUM HEAT **PROPERLY APPLIED**



→← Indicates where necessary air is taken in to mix with gas to develop perfect combustion at varying gas pressures.



↑ ↑ Barber Patented "Scrubbing" flame application to heater side walls—direct —no loss of heat.

THE perfect combustion or burning of gas is dependent upon its mixing with a proper amount of oxygen as may be extracted from the air. The BARBER PATENTED JET BURNER PRINCIPLE accomplishes perfect combustion, liberating all the heat contained in the gas you buy.

YOU put a tea kettle DIRECTLY above the gas flame if you wish it to boil quickly. You know that reflecting heat on it would be inefficient. Note that the Barber Gas Burner applies the heat DIRECTLY where it is required and is absorbed.

List Price $98.50

BARBER CONVERSION GAS BURNERS are made for all styles and sizes of furnaces, boilers and heating appliances—Complete data and latest prices are given in our new Catalog No. 30.

for the NEW BARBER BURNER No. 324-A, automatic and fully equipped—a price that opens up an immense new conversion market. It will allow hundreds of homes in your community to heat economically with gas. Write for our new sales folio, prices and attractive discounts, also "More Gas," which contains the complete BARBER story.

THE BARBER GAS BURNER CO.

FORMERLY THE CLEVELAND GAS BURNER AND APPLIANCE CO.

3702 SUPERIOR AVENUE « » CLEVELAND, OHIO

What the KOMPAK will do for Your Customers

HOT WATER *At All Times*—
— not just occasionally.

HOT WATER *At Every Faucet*—
— simultaneously.

HOT WATER *For the Last Bather, as well as the First*—
— even with a house full of company.

HOT WATER *For the Laundry*—
— even after the morning baths.

CLEAN HOT WATER, *Without Rust,*
— that can be used for cooking and drinking.

HOT WATER *That Requires No Attention*
— or forethought.

HOT WATER *Without Frequent Interruptions*
— due to mechanical failures.

HOT WATER *That is Just Right*—
— not steam, not lukewarm.

HOT WATER *That is Absolutely Safe,*
— against any possible contingency.

A life time of this trouble-proof service at a remarkably low cost from the KOMPAK *COPPER* AUTOMATIC GAS WATER HEATER. (The copper tank is guaranteed for twenty years).

THE KOMPAK COMPANY,
New Brunswick, N. J.

KOMPAK

HOT WEATHER SUGGESTION

When ordinary paints are being blistered by the hot August sun, an IMUNOL film remains cool and unruffled. IMUNOL is the non-drying compound for protecting Gasholder lifts. It was developed for that sole purpose and Gas Engineers who have used it will tell you it fills the bill.

If you want to eliminate rust and corrosion, an IMUNOL treatment will give you absolute protection at the water line and on the dipping surfaces.

Write today for complete data.

IMUNOL

REG. U. S. PAT. OFFICE
U. S. AND FOREIGN PATENTS GRANTED

INERTOL COMPANY, INC.
253 Broadway New York City

Western Branch
447 Sutter Street
SAN FRANCISCO

Forestalling Rush in September Heating Jobs

(*Continued from page 64*)

It is hoped that this offer will forestall a glut of orders on the first day of cool weather.

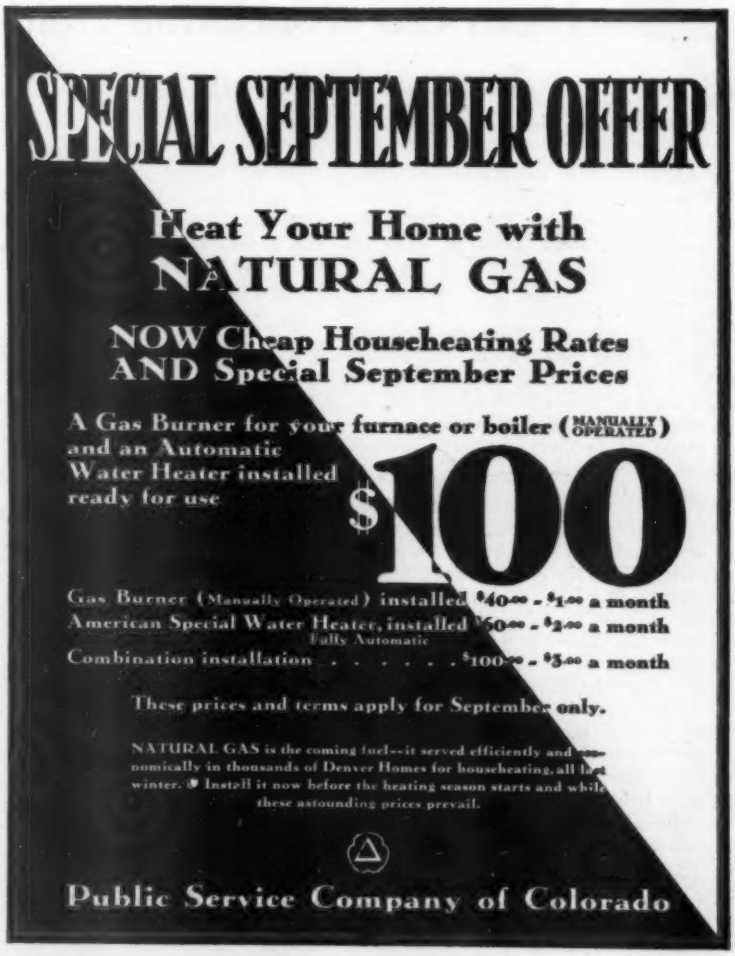
The Public Service Company uses its expert salesmen as checkers on the great board that is Denver. The city is divided into about thirty squares. These salesmen work in groups of two, each two working hand in hand for a year. Then these human checkers are shaken up and paired off in other territories with other buddies for another year. One of these two men is thoroughly trained to sell all of the commodities marketed by the Public Service Company. The other is an expert engineer who handles only heating equipment.

This engineer-salesman is given special schooling so that he is fully capable of going into homes for the purpose of estimating the kind of job to be done and the approximate cost of operating such an installation. Mr. Frank R. Jamison, Director of Publicity and Advertising for the Public Service Co. says, "It is positively uncanny how close these boys can come to a true estimate of the average winter bill. They generally come within 50c of the actual amount."

Every Christmas time a merry banquet is given for all the salesmen of the company and always there is some special feature. In 1929, Mr. Jamison acted as preacher and united in wedded bliss by means of hand-cuffs all the different couples of checkers who were to play together for the ensuing year on the Checker board of Denver.

Mr. Jamison says, "We can logically anticipate at least 2,000 orders in the month of September, 1930. People will again be frantic unless they heed our present offer and have furnaces installed during the summer months."

The highly efficient engineer-salesmen and their buddies are now sitting out on this campaign of making Denver ready for the lighting of a match when the first cold days come.


SPECIAL SEPTEMBER OFFER
Heat Your Home with
NATURAL GAS
NOW Cheap Housheating Rates
AND Special September Prices
A Gas Burner for your furnace or boiler (MANUALLY OPERATED)
and an Automatic
Water Heater installed
ready for use
$100
Gas Burner (Manually Operated) installed $40.00 - $1.00 a month
American Special Water Heater, installed $60.00 - $2.00 a month
Fully Automatic
Combination installation . . . . . $100.00 - $3.00 a month
These prices and terms apply for September only.
NATURAL GAS is the coming fuel--it served efficiently and economically in thousands of Denver Homes for housheating, all last winter. Install it now before the heating season starts and while these astounding prices prevail.
Public Service Company of Colorado

Effective Newspaper Advertisement

BOOK REVIEW

Materials for the Study of Public Utility Economics, by *H. B. Dorau*. Published by The Macmillan Company, New York, 1930. 975 pages. Price $5.

Many surprising sources of excellent material for the public-utility executive are summarized in this volume. It represents a reference work and a widely useful book of suggestions worthy of careful study. The main disappointment which the average reader will feel is that there is so little taken from each of the many worth while sources.

Historical, organization, and economic characteristics of utility affairs are dealt with. The approach of the author is altogether that of the economist, not that of the engineer. To some this may seem to be a disadvantage; but the major purpose of the work is clearly to give executive contact with many types of operating questions which should concern them. And in this effort the author is eminently successful. Particularly, the work is of value to gas executives because it draws a very large number of its examples and illustrations from electric, telephone, and transportation utilities.

If there be one criticism which the general reader may offer it is probably that the author has not at any point injected his own critical interpretation as much as most of us would desire. He has served essentially as a compiler rather than as a critic. The result is, nevertheless, a work of wide value to the management official in any division of public-utility affairs.

Practical Japanning and Enameling by *William J. Miskella, M. E.* Finishing Research Laboratories, Inc., Chicago. 256 pages. Illustrated. Price $3.50.

The widespread use of gas in industry has necessitated the industrial gas salesman and others interested in this phase of the gas industry, having at hand a great deal of information and data on those processes in which gas plays so important a part. The present treatise by Mr. Miskella not only takes care of these needs in the direction of discussing the general subject of japanning and enameling, but also devotes considerable space to a description of direct application of gas in this industry.

Handbook of Culvert and Drainage Practice. Armco Culvert Manufacturers Association, Middletown, Ohio, 350 pages. Illustrated. Price $2.00.

Distribution Departments and other branches of the gas industry which are particularly concerned with the matter of underground construction will find the present volume a valuable addition to their working library. The book contains a great amount of worth while data and information regarding the underlying principles of drainage and in addition there is considerable material relating specifically to the construction of drainage improvements in industrial fields.

Michigan Gas Association Holds Annual Convention

MARKING the completion of thirty years of continuous activity in practical gas research work, the Michigan Gas Association featured research progress and results in the program of its 38th annual convention held at the Grand Hotel, Mackinac Island, June 30 and July 1 and 2. It also elected as its president for the coming year Prof. Alfred H. White, head of the Chemical Engineering Department of the University of Michigan, who for the entire 30 years has been in charge of the association's research work at the university.

The Michigan Gas association fellowship founded in 1900, has been maintained ever since and is believed to be the senior industrial fellowship in the United States. The first holder of the fellowship was Herman Russell, now president of the Rochester Gas and Electric Corporation. It is significant of the change in the gas industry that the earliest research concerned itself with the Welsbach mantle, as lighting service was then 90 percent of the gas business. Of recent years, research has been along the lines of adapting gas to industrial heating purposes and of promoting economy and efficiency in production.

Professor White, reporting on the research work of the fellowship during the past two years, told of the study conducted by David Fox on the reactions between carbon and sodium carbonate at the temperatures of the water gas generator. Mr. Fox found that the addition of sodium carbonate to carbon will permit the reactions of the water gas set to take place seven times as rapidly as when no soda is added. It is believed that this may have important commercial application, but it may be necessary to change the design of water gas equipment completely in order to take advantage of it.

During the past year Stuart McLain, holder of the fellowship, has been working on the cause of the troublesome emulsions which sometimes appear in water gas tar. He has found an apparent relationship between the surface tension of the tar and its tendency to form emulsions. This investigation is still in progress.

Associate Professor E. S. Pettyjohn of the university, who for two and one-half years, has been devoting most of his time to research work maintained by the Michigan Gas association on the use of bituminous coal in water gas manufacture, reported on the finding of several bituminous coals, including two-non-coking coals, which can be used with economical benefit. His report shows that the proper cycle to be used in water gas operations varies with the individual coals and with the main object of the operator. The cycle for high capacity will differ from the cycle for highest efficiency. The cycle will also vary with the details of the design of the water gas set.

T. W. Weigele, experimental engineer of the Detroit City Gas company, told of experiments made by that company in the use of coking and non-coking coals in the water gas generator and in the carburetion of water gas.

President A. I. Snyder in his address to the association emphasized the value

Prof Alfred H. White

of research work and the necessity of educating the gas organization's personnel and of coordinating the different departments.

The Gas House Heating Committee, F. J. Woolfenden, chairman, reported that the number of gas-house-heating customers in Michigan has grown from 36 in the winter of 1924-25 to 1,355 this past winter.

Consumption for house-heating in the state has grown from 31,746,600 cubic feet in 1924-25 to 847,018,300 cubic feet last winter. Gross revenue from house-heating has increased from $22,987 in 1924-25 to $626,800 last winter.

The Suburban Gas Sales Committee, T. D. Rasenberg, chairman, reported that 110 miles of high-pressure transmission mains were laid in Michigan last year, bringing the total up to 508 miles. Meters gained in 1929 numbered 10,602, bringing the total suburban meters to 51,857.

L. W. Gaskell, presenting a paper on "Domestic Utilization of Gas," pointed out that in spite of great increases made in industrial and commercial lighting, 92 percent of last year's total sales of thirty-eight billion cubic feet in Michigan, were for domestic uses, including house-heating.

Mabel Claire Atwood reported on "Home Service Experiences in Grand Rapids."

Other officers elected in addition to President A. H. White are:

Vice President, J. E. Spindle, Grand Rapids.

Secretary-Treasurer, A. G. Schroeder, Grand Rapids.

The convention of the Michigan Gas association was held in conjunction with the convention of the Michigan Electric Light Association. The two associations met in joint session under the auspices of the Michigan Committee on Public Utility Information on Monday, June 30. Addresses on the program were: "What the Offensive Against the Supreme Court, the Public Service Commissions, and the Utility Industry Means," by Henry C. Spurr, editor of Public Utilities Fortnightly; "A Michigan Editor's View of Michigan's Public Utilities," by Arthur R. Treanor, editor and manager of the Saginaw News; and "The Public's Interest in Public Utilities," by Arthur W. Stace, director of the Michigan Public Utility Information Bureau.

A feature of the joint session was the presentation of the McCarter medal for lifesaving by resuscitation to Miss Gertrude Smale, Consumers Power company, Pontiac, and George R. Bean, Consumers Power company, Saginaw. Miss Smale saved the life of her own father, and Mr. Bean saved the life of a fellow employe who had been overcome by gas.

Considerations Governing the Selection of Coke Sizes

E. W. ZIMMERMAN AND H. H. HIMSWORTH

A STUDY of the screen equipment including the screen sizes and the results obtained from these different plants as evidenced by the analyses of Domestic coke shipped, made by the Standard Method, shows a wide divergence in sizing treatment and in results obtained. This is not surprising when it is considered that no two plants are exactly alike in carbonizing type or size, in raw materials used, or in the requirements of their customers.

It was the feeling of the Committee that consideration of types of screening equipment used for certain purposes would be interesting from the mechanical standpoint. The attainment of the purposes should also be of interest and behind all is the question "Why"—"Why screens and screen sizes and what should the various sizes be?" The answers are obviously different for different plants, each with its own conditions and especially so for the different uses to which the fuel is to be put. The choice of the correct size for a given condition is apt to be influenced

largely by what we have to give. When the producer asks the sales manager "What'll you have?", the correct answer of the latter is expected to be "What've you got?" Often however, the sales manager specifies exactly what he does want couched in terms of results expected and too often it is necessary for the producer to compromise, because of lack of knowledge or reluctance to change normal screening procedure.

The character of equipment used in burning the coke will influence the choice of coke size. For best results it is a question whether enough consideration is given to this. The coke characteristic of segregating into different sizes at every opportunity, which means at every handling, may defeat the purpose of continuous uniform mixtures throughout the period of its use, so that a customer requiring a uniform stove coke may use at first the larger pieces which have rolled toward the perimeter of the pile, then after a period work into the smaller and more uniform part of the pile, and at some period may be forced to use the material under the dumping chute—the coke which will include the result of handling—the small nut, pea and breeze. Although the true stove, uniformly mixed, should be correct, widely varying fire handling and results will ensue from segregation and the predominance at times of the smaller sizes which are just within or entirely outside the screen band and due to poor screening or to handling which causes breakage.

Consideration of these points emphasizes the value of good screening and also points toward narrower size limits or else to compromise by saying that "size" in reality defines only the maxim pieces and that anything less than this can be burned provided it is not breeze. That this thought is in the minds of many is evidenced by the fact that rescreens on particular size bins are usually smaller than the original minimum, and the uniformity and comparison of the resulting product is thus influenced materially by previous handling—whether from stock or wharf, and by bin and conveyor breakage. The compromise is true to a certain extent but not when easy handling of fires and efficient combustion is considered.

Attention in the trade is chiefly given as to size to suit the mechanical or physical demands of the specified furnace and these factors do enter into the selection of the size limits or bands, however, more consideration could be given to the influence of sizes on combustion and the results evidenced in the ash or clinker. It was with this thought that a study of the subject was undertaken. The attempt was made to determine the effect on combustion control and clinkering tendencies of charging—(a) various mixtures of sizes to a test furnace and (b) uniform sizes through definite ranges.

The tests and the discussion seem to show again the advantage of narrow sizes, especially with the smaller coke. The effect of thus screening is to produce a more uniform product, to reduce segregation, to allow easier control of combustion and to reduce clinkering tendencies,—all to the end of more efficient combustion and better satisfied consumers.

Education can mitigate otherwise troublesome drawbacks, but education of the consumer is costly, not always convenient to receive and absorb and its need should be kept to the economical minimum.

Abstract of paper read before Production Conference, May, 1930.

Gas Conditioning

C. W. GARRISON AND W. L. SHIVELY

THE term "gas conditioning" may be broadly understood to mean the removal of those constituents of manufactured gas which may condense in the distribution system to the detriment of the efficient functioning of the system. The principal constituents of manufactured gas which so condense and give rise to distribution difficulties are water and naphthalene. The term "conditioning" is especially fitting since complete removal of condensible constituents is not necessary and, in the case of water vapor, may not be wholly desirable. It will be developed that it is the condensation of water and naphthalene, rather than their presence in the gas which gives rise to so much trouble; hence removal to the extent that no condensation occurs is all that need be accomplished to eliminate distribution difficulties from this source.

It may be regarded as established that the internal corrosion of mains services and meters is caused by traces of impurities in the gas, such as oxygen, hydrocyanic acid, hydrogen sulphide, ammonia, etc., in the presence of water. This corrosion can be regarded as due to electrolytic action taking place in dilute aqueous solutions of the above impurities, such action being primarily dependent upon the formation of solutions. The deposition of water is, therefore, a necessary condition for the resulting corrosion.

The principal practical methods of effecting gas dehydration fall under four neads. They are, 1 by compression, 2, by refrigeration, 3. by solid absorbents, and 4. by liquid absorbents.

The manner in which dehydration is secured by the employment of pressure for distribution is briefly as follows: The gas is compressed at the works and is cooled in the transmission main to ground temperature. Expansion of this gas through a district or house governor will cause a marked increase in volume of the gas, so that the moisture originally in one cubic foot of gas is distributed through several cubic feet. In other words, the gas is now only partially saturated with water. The same reasoning applies to the naphthalene content of the gas, so that the gas may now properly be described as "conditioned," in that no subsequent condensation of either water or naphthalene will ordinarily take place.

Dehydration by compression is prohibitively expensive when compression is solely for the purpose of dehydration. The power requirement alone for average conditions would amount to about double the total charges of a process involving scrubbing with a hygroscopic solution, such as calcium chloride. It has been shown that, when gas is already compressed for distribution purposes, the additional compression and aftercooling necessary to ensure a dry gas in the mains may be accomplished for a reasonable figure. Such a procedure should be seriously considered; since high pressure mains are almost always of steel, which is less resistant to internal corrosion than cast iron, and the corrosive condition existing in wet mains is intensified and corrosion accelerated by increased pressure.

Dehydration by means of refrigeration is a feasible method which has had considerable practical application. The Gailey process for drying the air for blast furnaces employed a method of direct refrigeration, in which the air was passed through a chamber filled with pipe coils through which the brine from an ammonia refrigerating plant was circulated. The moisture was deposited on the coils and, of course, had to be thawed off periodically by pumping warm brine through the apparatus. In recent years the conditioning of air for theatres, public buildings, and in the industries has been widely adopted. The Carrier Engineering Corporation has developed a process of air conditioning in which dehydration is accomplished by scrubbing the air with water cooled in a special type of refrigerating apparatus. In the application of these methods to the dehydration of manufactured gas, however, certain difficulties develop. As compared to dehydration with a liquid absorbent, it will be found that a system employing mechanical refrigeration ordinarily entails a higher cost for plant, higher operating cost, and a more skilled type of supervision.

In dehydration by solid absorbents a solid material capable of condensing vapors through so-called surface action is employed. A well known example of such a substance is silica gel. A number of air drying plants have been erected by the Silica Gel Corporation. In the application of silica gel to the dehydration of manufactured gas, certain special problems would have to be worked out, notably a method of recovering and returning the absorbed light oil to the gas. Large chamber absorbers in pairs would be required so as to provide one active unit, while the other was being activated. The back-pressure thrown on the line by the absorbers is also an item. As with refrigeration, the first cost of a silica gel plant would be rather high.

This brings us to a consideration of the fourth and last of the enumerated methods, i.e. dehydration by a liquid absorbent. We were led to concentrate upon this process by a consideration of the fundamental difficulties presented by other possible methods. The liquid absorbent ordinarily employed is a concentrated solution of calcium chloride. Removal of water

vapor is accomplished by washing the gas with this solution in a scrubbing tower. The process is continuous, requires only one scrubber, and involves no apparatus or operations with which plant operators are not already familiar. The first cost of the plant is lower than for other processes, and operating costs are gratifyingly low. No valuable constituents are removed from the gas and the required degree of water removal is easily controlled.

No attempt is made to remove all of the water vapor from the gas. It is desired to remove only sufficient water vapor to prevent the condensation of liquid water in any part of the distribution system. That is, the dew-point of the gas must be slightly below the coldest part of the system. At Grand Rapids, it has been found that dew-points as high as 65° F. in summer and as low as 25° in winter satisfactorily meet these conditions. These values will vary of course according to climate and local conditions. In practice, a recording thermometer of the weekly record type is installed at the position in the system which a preliminary survey has shown in the past to have the lowest gas temperature. This thermometer chart is examined weekly and the dew-point for the forthcoming week is fixed at 5° F. below the lowest temperature shown on the chart. Under these conditions, condensation of water is prevented.

The operation of the Grand Rapids plant has afforded an opportunity to obtain exact cost figures on the process. Two carefully conducted tests of the system while operating under typical winter and summer conditions gave the following daily operating costs for 5,000 M cu. ft. gas treated:—

	Winter Conditions	Summer Conditions
Power		
At 1.5c per H. P. hour, Liquor pump $4.48, Oil Pump $3.00	$ 7.48	$ 7.48
Steam		
At 50c per M lbs. for exhaust steam at 6 lbs. pressure	3.40	8.64
Labor		
Operator at 55c per hr., one-fourth one man's time each shift 6 × 55c = $3.30		
1 hr. shift foreman's time per 24 hr. = 1.00	4.30	4.30
Make-Up Liquor		
10 gal. at 8⅓c per gal.	.83	.83
Cooling Water		
At 2c per M gals.	None	2.37
Maintenance		
Estimated at	3.00	3.00
Total Daily Operating Costs	$19.01	$26.62
Cost per M cubic feet gas	.38	.53

Average Daily Cost = .46c per M cubic feet

It should be noted that these costs also include the cost of naphthalene removal. The addition of fixed charges to the above operating costs makes a total which is less than .75c per M cubic feet of gas treated.

Some objections have been raised against dehydration from time to time. Perhaps the commonest of these is the fear that the inception of dehydration may bring about those troubles which sometimes arise when dry natural gas is introduced into a system formerly used for the distribution of wet manufactured gas. These troubles are: Drying out of meter leathers, drying out of joint packings, and dust troubles. It may be definitely stated that these phenomena are not associated with the dehydration of manufactured gas. This point is fully confirmed by experience with upward of thirty-five plants which have been installed to date. There are two principal reasons for this freedom from trouble, one being that dehydrated gas possesses only a fraction of the drying power of natural gas, the other that oil fog lubrication is generally practiced with dehydration.

Any slight tendency toward dust troubles which might exist with dehydration is entirely overcome by the use of oil fog lubrication. By this is meant the addition of a small amount of a persistent oil fog or mist to the gas prior to or during distribution. A suitable oil fog will travel to all parts of the distribution system, and with its use an oil moist condition for the interior of the mains and services is substituted for the watermoist condition formerly prevailing. As small a quantity of oil as one gallon per million cu. ft. of gas is satisfactory, and a cheap, readily obtainable oil such as wash or absorbent oil is suitable for the purpose.

Conclusion:—It has been shown that the evidence of the improvement of service and meter conditions, which may be effected by the distribution of a dehydrated gas free from naphthalene, is conclusive and in accord. There has been a wide adoption of the Holmes "Dri-Gas" process in England and plant managers there speak enthusiastically of the benefits of the process. English experience indicates the actual return of the investment to be in excess of twenty percent, with no allowance made for increased carrying capacity of mains, increased gas sales, reduced corrosion of mains, and enhanced public good will.

Data from plant scale operation indicates the operating charges for dehydration and naphthalene removal are less than five-tenths of a cent per M cubic feet gas; and with the addition of fixed charges the cost of the process is less than three quarters of a cent per M cubic feet. This cost is in most cases exceeded by the direct savings in distribution costs, such as reduction or elimination of drip pumping, greater freedom from rust and naphthalene complaints, elimination of freeze-ups, and increased meter life.

The trend of distribution conditions indicates that it will be more and more difficult to give reliable service with a wet, naphthalene-bearing gas on account of the increased use of appliances with pilot lights, thermostats, etc. A process which will improve service conditions and result in lowered distribution costs commends itself for the serious consideration of every gas engineer.

Abstract of paper read before Production Conference, May, 1930

The Use Actifier Air From Liquid Purification in Gas Producers

M. T. HERRIED.

THE Seaboard process of liquid purification has been in operation at the plant of the Connecticut Coke Company since October, 1928. All of the gas produced at this by-product coke and gas plant is treated by this process for the removal of both hydrogen sulphide and hydrocyanic acid. The volume of gas being purified is at present about 16 million cubic feet per day.

In the process two operations are carried out. The hydrogen sulphide and hydrocyanic acid are removed from the gas in a scrubber by the use of a dilute solution of soda ash. The resulting foul soda solution is then treated by a large volume of air in a second tower called an Actifier. The aeration regenerates the solution so that it may be used over again in the absorber. The air leaving the actifier contains most of the hydrogen sulphide in a very dilute form. This actifier air is used in both the gas producers and boilers at New Haven in place of the regular air supply, in this way avoiding any possible odor problem due to discharge of H_2S into the atmosphere.

The actifier air leaves the actifier at about 36° C., nearly saturated with water vapor. The use of this hot saturated actifier air in the gas producers effects a saving in the amount of steam required to heat and saturate the air blast entering the producers. A further advantage of heating the actifier air is the elimination of freeze-ups on blower impellers and in blast lines. The volume of actifier air required for actification is also reduced appreciably because of the higher temperature in the actifier.

The air is sucked through the actifier tower both by the producer blowers and the boiler blowers. General Electric turbo blowers discharge part of the actifier air to the producer grates and Sturtevant blowers deliver the rest of the actifier air to the boilers. The producers require about 800,000 cubic feet of air per hour, while the boilers use from 1,000,000 to

2,000,000 cubic feet of air per hour, depending on the seasonal load. As the volume of actifier air amounts to about 1,400,000 cu. ft. per hour, the total requirement of producers and boilers is more than sufficient to take care of all the actifier air available. As actifier air is drawn both by the boilers and producers, a check valve is installed in the producer air line so that the boiler blowers cannot possibly cause a suction on the producers, if the producer blowers should by chance be shut down.

The apparatus at New Haven is so designed that no solution spray is carried away from the actifier by the actifier air. This result is obtained by placing dry hurdles on the top of the actifier above the solution sprays. The impellers on the turbo blowers are made of a special alloy to resist the possibility of corrosion.

The New Haven Liquid Purification plant has operated with excellent results over the year and half period. The method in use for handling the actifier air has been eminently satisfactory and has demonstrated the practicability of using the Seaboard Process in gas plants located in large cities and close to residential districts.

Abstract of paper read before Production Conference, May, 1930.

Method of Determining Value of Gas Company's Property

Other Important Higher Court Decisions Involving Gas

LEO T. PARKER

ORDINARILY, the actual cost of property to a gas company is not the proper amount for valuation in determining gas rates. The present value should be determined by the Commission. So held the higher Court in the recent case of Logan Gas Co. v. Public Utilities Commission, 169 N. E. 575. Also, it is interesting to observe that this Court held that an allowance of 7 per cent for overheads, cost of financing, going concern value, etc., in valuing gas company's property for rate-making purposes, is not unreasonable and does not violate the United States Constitution.

The facts of this case are that a gas company made application for increase of its rates. The Public Utilities Commission fixed the rates, after seting a valuation on the gas company's real property on which wells are situated, considerably lower than the actual cost to the company. The testimony showed that much of the leasehold property is without producing wells.

The gas company appealed to the higher Court on the contention that this method of valuation was incorrect and that allowance of only 7 per cent for important items, as general overheads, financing cost, going concern value, etc., is entirely inadequate. However, the Court upheld the Commission's valuation, saying:

"We are of opinion that the value should have been determined by the Commission rather than the actual cost of these leases to the company . . . The remaining grounds urged for reversal of the Commission's order are that there was an allowance of 7 per cent as sufficient for general overheads, cost of financing, going concern value, etc.; that the order of the Commission violates the Fourteenth Amendment of the Federal Constitution. A majority of the Court are of opinion that the finding of the Commission was neither unreasonable nor unlawful in those respects."

When Property Owner is Personally Liable for Injuries Caused by Gas Explosion

It is quite apparent that a gas company is not liable for injuries caused by an explosion of gas, unless its employes negligently caused the leak or failed to repair it. Moreover, it is important to know that a property owner is personally liable for injuries caused by exploding gas which escapes as a result of his negligence and the gas company is not liable if the property owner knows that gas is escaping and fails to promptly notify the gas company.

For example, in Ingledue v. Davidson, 283 Pac. 837, it was disclosed that an unused gas pipe extended upwardly into a restaurant from a basement. This pipe was connected with a pipe which was supplied with gas. One day an explosion occurred which resulted from gas that escaped from the upper end of the unused pipe. The explosion caused a large mirror to fall upon a patron who was seriously injured. He sued to recover damages. The evidence showed that the gas which caused the explosion came from this unused pipe, which was either not plugged, or so insecurely plugged that it permitted gas to escape from it. There was a brick wall behind the mirror, and behind this pipe were holes where brick had been left out. These holes apparently had become filled with this leaking gas. Some of this gas found its way to the edge of the mirror and became ignited, and this ignition was communicated to the gas in the holes, causing the explosion.

The property owner attempted to avoid liability on the grounds that he had notified the gas company that he smelled escaping gas. However, it was shown that the property owner failed to request the gas company to investigate and repair the leak. Also, it was shown that the property owner was aware of the location of the unused gas pipe and he did not investigate the source of the leak. Therefore, the Court held the property owner solely liable, saying:

"The patron was an invitee on the premises at the time of the explosion. The owner or occupier of a building must exercise ordinary care to render the premises reasonably safe to persons whom he induces to come thereon by invitation, express or implied . . . And, as such invitee, respondent (restaurant owner) owed appellant (patron) the duty of maintaining the property in a safe condition and of exercising reasonable care in protecting him from injury . . . It appears from these facts that at no time prior to the explosion had this company received any notice that there was any leakage of gas from any of the gas pipes on the premises of defendant (restaurant owner), nor information sufficient to put the company upon notice that such leakage existed. Nor can the doctrine . . . be invoked against the company for the additional reason that the pipe, the leaking from which caused the explosion, was a part of the house piping of the said restaurant, and not under the actual control of this company."

Gas Company Held Not Liable for Explosion

It is well established that a gas company is liable in damages for injuries caused by an explosion of escaping gas, providing the testimony indicates that the explosion resulted from negligence of the company's employes. However, if the testimony indicates that the gas company exercised care to stop a leak or shut off gas, it is not liable but the liability lies with the person who tampered with the connections and caused the leak.

For instance, in Wright v. Southern Counties Gas Co., 283 Pac. 823, it was disclosed that when a tenant in an apartment building moved out he ordered the gas company to turn off the gas. This order was executed by the gas company. In turning off the gas, the company not only turned off the stopcock controlling the passageway for gas into the meter, but sealed and locked the same; the seal used for this purpose consisted of two pieces of iron, which fitted over the valve, protecting it from interference and making it inaccessible, so long as the seal remained with its catch unbroken. This catch, however, does not appear to have been made of very substantial material, and a slight blow from a hammer or other like instrument would readily break the catch. With the catch destroyed, the seal would require a new catch in order to rend it again effective.

A new tenant rented the flat and the landlord assisted him to move in the furniture. Subsequently an explosion occurred, resulting from escaped gas, seriously injuring the new tenant who sued both the gas company and the landlord for damages.

It is interesting to observe that the higher Court held the landlord personally liable, relieving the gas company from liability, saying:

"The authorities are numerous to the effect that a property owner is not bound to keep his premises absolutely safe, but it is universally held that an owner of premises must use ordinary care to keep the premises in a safe and suitable condition, so that they will not unnecessarily or unreasonably expose any one to danger who may lawfully be thereon . . . Thus, the testimony in this case shows that the meter was locked and sealed. It likewise shows that some one tampered with the lock and seal and turned the stopcock, so that the gas would again flow through the meter . . . It likewise shows that the defendant (property owner) had control of the flat in question; that he was in the flat about two weeks before the explosion, had taken furniture there preparatory to renting the same, and had placed in the living room, near where the open gascock was found, a gas heating stove . . . Upon this testimony, the jury was warranted in drawing the inference that the defendant had tampered with the lock and seal on the gas meter, and had opened the gascock in the living room, and subsequently failed to close the same."

Employe Entitled to Compensation

Generally speaking, a gas company is bound to pay compensation, under Workmen's Compensation Laws, to a workman who is injured while endeavoring to rescue a fellow workman from peril although the injured workman was not acting within the scope of the employment when the injury occurred.

For instance, in Conveyors' Corporation v. industrial Commission, 228 N. W. 118, it was disclosed that an employe named Collins, employed by the Conveyors' Corporation, fell into a tank containing gas. An employe, named Galko, of another company performing work for the Conveyors' Corporation was killed when he attempted to rescue Collins. Galko's dependents sued the Conveyors' Corporation for damages whose counsel contended that Galko was not acting within the scope of the employment when the accident happened. However, the Court held the corporation liable and stated the following established law:

"The Workmen's Compensation Act defines an 'employer' as one who has any person in service under any contract of hire, express or implied, oral or written, and an 'employe' as one who is in the service of another under any such contract but not one whose employment is not in the usual course of the business of his employer . . . There was no express contract of hire for that work and no agreement to pay a wage therefor. But there was a contract of employment by implication . . . This arises from the following considerations: It is the duty of an employer to rescue his employe from a position of imminent danger in an emergency . . . Any other rule would be inhuman and unthinkable. Our statute imposes such duty. It requires that the employer 'shall do every other thing reasonably necessary to protect the life of the employe . . . It was his (Galko's) duty towards his employer to act immediately and with greatest possible speed to rescue Collins, who was not known to be beyond resuscitation."

When Unpaid Seller May Repossess Gas Appliances

The fact that many municipal gas companies sell various kinds of household equipment results in the importance of the decision of the recent case of Morrison v. Segal, 169 N. E. 789. In this case a seller sold gas stoves to an apartment building owner under a contract of sale by the terms of which the purchaser agreed to pay for the stoves ninety days after delivery.

The testimony tended to prove that the stoves were set up in the apartments on the day when sold, each resting on four glass cups, with a pipe connecting the stove to the chimney, and easily removable without injury to the building.

A person named Segal purchased the apartment building and litigation resulted when the seller of the stoves attempted to remove them from the building. The new owner contended that the stoves were legal fixtures and a part of the building.

However, since the stoves could be detached without injury or damage to the building, the Court held the seller of the stoves entitled to remove them, saying:

"The judge was justified in finding upon the evidence that the stoves did not become a part of the real estate."

Therefore, the rule is established that personal property, such as gas appliances, do not become a part of real property, if the same can be removed without permanently defacing or damaging the real property.

Duty of Gas Company to Keep Premises in Safe Condition

Usually, a tenant, as well as the owner of property, is bound to exercise ordinary care to keep the premises in safe condition, otherwise he is liable in damages for an injury sustained by a patron or any other person who rightfully is on the premises. This law is particularly applicable with respect to entrances and public passageways. If, however, the tenant and owner exercise an ordinary degree of care to maintain the building in a safe condition neither the tenant nor the owner is liable in damages for an injury sustained by a customer or other person.

For illustration, in Weidman v. Consolidated Gas Co., 148 Atl. 270, it was disclosed that a gas company leased the ground floor of a building and in the entrance was a rubber mat of the usual kind having a flexible steel frame of interlocking units with their open spaces alternately inlaid with hard rubber about one inch thick. The mat was made to lie flat and was kept flat through the manner of its construction and its own weight.

A woman pedestrian, who stepped into the entrance to avoid a crowd, tripped on the mat which caused her to fall. She sued the gas company to recover damages. It is interesting to observe that the higher Court held the gas company not liable, stating the following important law:

"She did not leave the sidewalk to enter the building or the better to observe the display of the show windows, but to escape the crowded condition of the public thoroughfare that had transiently interfered with her progress . . . When she was compelled to step out of the public way, she was aware that she had entered upon a private passageway, since she testified that she knew that she was going inside the building line . . . By inducing or inviting the use of passageways built for the beneficial enjoyment of the premises, the owner or occupier raises the implication that nothing is known of particular perils. The liability, therefore, of the owner or occupier in the use of the passageway by a pedestrian, who has been deflected from the public way by other travelers, but who continues in the general course of the highway, *depends on the failure of the owner or occupier to use ordinary care and prudence to keep it in a reasonably safe condition* and suitable for such user, in subordination, however, to its primary purpose of a private way. So, because it is a private entrance, the owner or occupier of the premises had the right to lay suitable mats or runners, and their use was not a breach of any obligation, unless the passageway became unsafe for its customary use by reason of the defective condition of a mat which the traveler did not know, but which the owner or occupier had negligently suffered to exist *after he had notice, actual or constructive,* of the defect long enough before any damage was sustained to have removed or repaired the dangerous condition or given warning of its existence."

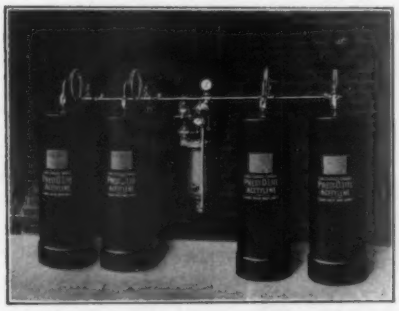
Seek Permission to Extend Mains

The Wanakah, N. Y. Gas Corporation has applied for permission to extend its distribution mains into the towns of Hamburg, Evans and Eden, Erie County, New York. The petition states that the distribution lines of the company are at a point some distance from the point described in the franchise and it will be necessary to lay distributing lines through the franchise territory to connect with existing distribution system in order that gas may be supplied.

EQUIPMENT NEWS

New Type Oxygen and Acetylene Manifolds

In order to furnish small users of oxygen and acetylene with an economical means of gas distribution, Oxweld Acetylene Company, 30 East 42nd Street, New York, has introduced two small capacity manifolds. Where it is necessary to have a number of welding stations and the consumption of gases is not large enough to warrant the installation of an acetylene generator and large oxygen manifold, these small manifolds will prove to be an effective means of having a piped supply of gases.



Four cylinder acetylene manifold

The 4-cylinder acetylene manifold is of the wall type. Each cylinder lead has a valve in the header so that each cylinder is independent of the others. This makes it possible to use either one, two, three or four cylinders at the same time so that a cylinder may be replaced without shutting off the acetylene supply. Each cylinder connection is fitted with the Prest-O-Lite Flash Arrestor. The manifold is supplied with connnections for Prest-O-Lite cylinders.

The 4-cylinder acetylene manifold is designed for installations where piped acetylene is required and where the installation of a generator would not be feasible. The installation of these manifolds must conform with all standard regulations and the advice of the manufacturer should be obtained before making an installation.

The 6-cylinder oxygen manifold is of the wall type and has the duplex feature just as larger Oxweld manifolds have, so that three cylinders may be changed while the bank of three on the other side is maintaining the supply of oxygen.

These two manifolds have been designed particularly for use by welding schools. Distribution lines from the manifolds supply the gases to each welding station in a way that permits each student to work most efficiently. The increased amount of instruction in welding being given in leading industrial and engineering schools and the establishment of schools especially to teach welding has led to the development of this new apparatus.

Lambert Noiseless Reversible Meter Backstop

The Lambert Meter Company, Brooklyn, N. Y., announces the development of a noiseless reversible acting meter backstop.

It is so designed that it is possible to get as many as sixteen reverse revolutions of the tangent before it is stopped and a minimum of four reverse revolutions.

It presents flag arms and other parts of a meter from being strained and broken due to back pressure caused from temperature changes with the usual "click" stopping the tangent too soon.

It consists of two clicks, one attached to the crank frame and the other to the axle shaft. During the normal operation of the meter tangent clears the crank frame click which normally lies horizontally. The other click clears the first one due to its eccentric motion. When the tangent operates in reverse motion the second click engages the crank frame click which is lifted upright and then stops the tangent.

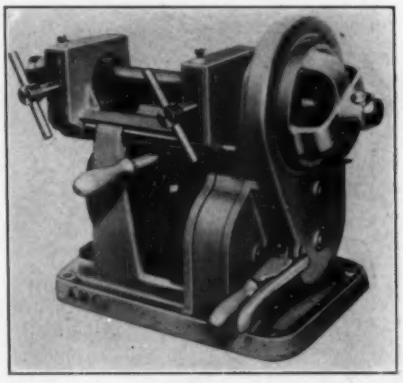
Patent application has been made for the Lambert Noiseless Reversible Backstop.

New Type Pipe Threading Machine

A new pipe threading machine, designed for a wide range of uses, has been developed by the Axelson Manufacturing Co., Ltd., Los Angeles, Calif. Its operation is simple and the machine occupies a minimum of space, according to the manufacturers. The pipe that is to be threaded remains stationery while the standard square die is revolved, cutting the thread. Long stands of assembled pipe or bent pipe may be conveniently threaded as it is unnecessary to rotate the units. The work is gripped by two jaw chucks which are practically automatic and instantaneous in action. Standard square dies, obtainable from practically any supply house, are readily adapted to the cutter thread. Threads can be cut on material from ½" to 2" in diameter and the power is supplied from a ½ H. P. compound wound motor, installed directly beneath the pipe holder brackets. Electric current of 110 or 120 volts, either 50 or 60 cycle, may be applied.

The manufacturer claims that the threader will cut at the rate of 17 revolutions per minute on all sizes from ½" to 2" and the required time for completing 11 threads is about 40 seconds. After the thread is completed the dies are reversed and during this operation rotate at 34 r. p. m.

In addition to cutting a clean, true thread, attachments are available for the cutter head to permit cutting off, reaming and bolt making. A bulletin describing

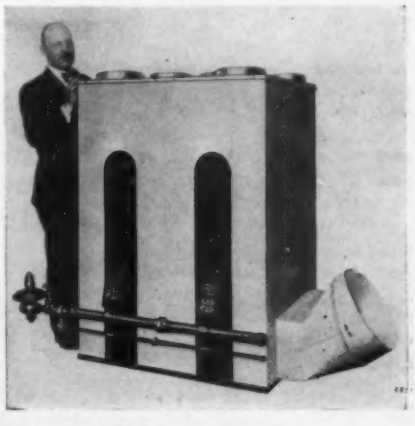


Axelson Pipe Threading Machine

the new pipe threader can be procured from the Axelson Manufacturing Co., Ltd., Los Angeles, Calif.

New Pressed Steel Gas Fired Furnace

A very interesting development in heating equipment obtains in the new, pressed-steel gas-fired furnace which is announced



Mueller Gas-Era pressed-steel Furnace

by the L. J. Mueller Furnace Company. The new furnace has been especially built in response to the great increase in the use of gas for heating, and the subsequent demand for a correctly designed,

high-grade furnace, in harmony with modern standards as to appearance, and available at a popular price.

The Mueller Gas-Era pressed-steel furnace, which is in the price class of the

One of the processes involved in manufacturing the Mueller Gas-Era Furnace

better conversion burners, incorporates various features which have become possible only due to the equipment available in the Mueller factory. This plant is completely equipped with presses for sheet steel work, foundry facilities, and machinery for making casing and other equipment for furnaces. In addition to a complete line of both coal and gas-fired furnaces, boilers and cabinet heaters, the company also produces cast and stamped grilles and registers and furnace fittings in the same plant, requiring all types of machines necessary for any kind of metal work.

Each heating unit or "section" of the furnace consists of two half sections welded together in a manner to form a most effective gas combustion chamber which graduates into a baffled serpentine heat travel provided with ample corrugations to secure a maximum of prime heating surface. Heavy gauge, copper bearing sheets are used. This furnace is approved in all sizes by the American Gas Association, for an input rating of 45,000 B.t.u. per section. A straight side casing with flat top, permitting of taking off all warm air risers vertically contributes to a very neat, compact and convenient assembly and is practical due to an overall height of only 53".

An exclusive feature of this furnace is the entirely sectional construction, for which is claimed a number of distinct advantages. The furnace is shipped as a package unit, in fibre cartons, and a proper size assembly for any job is readily handled by one man. Once the number of units or sections for a given job have been determined, it is only necessary to send from open stock the proper number of packages.

The packages containing sections measure only 33½" x 6¼" x 41½" and those containing the casings will be limited to 31¾" x 9" x 54" in size. Shipment by express will be possible at very nominal cost.

The accompanying illustrations show one of the interesting processes involved in manufacturing this product, and a complete two section furnace assembly. The huge 500 ton press turns out half sections of the heating units in one operation. The machine shown is the seam welder on which the half sections of the heating units are welded together. The comparative overall height of the flat topped casing is brought out by the figure of a man of average height, in the other illustration. Further information and prices may be secured by writing to the manufacturers either at Milwaukee or at any of their branch offices.

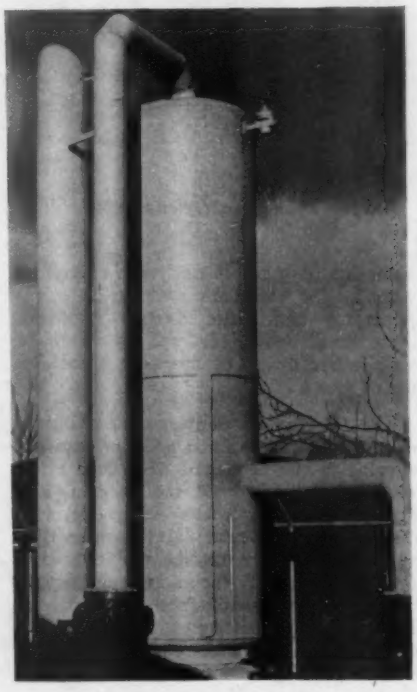
Blaw-Knox Gas Cleaner

The Blaw-Knox Company, of Pittsburgh, Pa., announce they have acquired the sole manufacturing and sales rights of the Ac-me Gas Cleaner, formerly manufactured, under license agreement with the Empire Oil & Refining Company, by Mr. D. A. Sillers, at Dallas, Texas. The name of this unit will be changed to the Blaw-Knox Gas Cleaner.

The Blaw-Knox Gas Cleaner is a contacting and separating device performing two functions,—first, contacting dust particles with oil or other liquid; second, separating oil with dust from the gas by contacting surface plus centrifugal force. Gas entering the side inlet is blown by nozzles into a body of liquid, causing tremendous agitation and bringing the dust particles into intimate contact with the oil. Ascending, the gas passes through the first separating head into the intermediate chamber, then into the final mist extractor, from this into the upper chamber and to the outlet clean and dry. Run-down pipes from each chamber carry the separated oil back to the main body of oil in the base of the cleaner.

The Blaw-Knox Gas Cleaner installed on the intake side of the compressor station protects the valves, cylinders, rings, piston rods, and packing, and assures greater continuity of service. Installed at the city gate station, it protects meters, and assures more accurate measurement of gas through orifice and displacement meters.

An illustrated bulletin describing general operation and performance of the Blaw-Knox Gas Cleaner is available and will be mailed on request.



Blaw-Knox Gas Cleaner

Announce Leasing of Larger Quarters

Officials of the Interstate Public Service Company have announced the leasing of large quarters in Goshen, Ind., and plan to occupy an entire building with division, district and local offices. A 10-year lease has been signed on the building and work will begin immediately on remodeling. William E. Murchie is the Goshen-Warsaw district manager. It is planned to have a complete appliance display on the first floor. Increase in business made enlargement of the offices imperative.

A BETTER METHOD OF MAKING PIPE

PIONEERED BY
REPUBLIC STEEL
CORPORATION

REPUBLIC ELECTRIC WELD PIPE

MADE BY A NEW PROCESS
CONTROLLED EXCLUSIVELY BY
REPUBLIC STEEL CORPORATION
YOUNGSTOWN . OHIO . . . . .

BACKED BY A MILL AS MODERN AS THE METHOD

Blazing a trail far removed from all established pipe manufacturing practice, Republic Steel Corporation has completed a new plant to be devoted to large scale production of Republic Electric Weld Pipe.

The product of this plant offers many advantages. Tests and actual service prove the weld to be one hundred percent—perfect—stronger than any other part of the pipe. Wall thickness is uniform and the finished pipe is perfectly round, smooth and free from scale and oxide.

Over one thousand miles of Republic Electric Weld Pipe have been placed in service without a single record of leak or defect—without a single complaint of any kind,—convincing evidence of the quality and uniformity of this mechanically perfect pipe.

REPUBLIC *ELECTRIC WELD* PIPE

REPUBLIC STEEL CORPORATION
YOUNGSTOWN, OHIO

NEWS OF THE GAS INDUSTRY

Texas Gas Utilities Pipeline Completed

Announcement of the completion of the new high-pressure natural gas pipe-line of Texas Gas Utilities Company, subsidiary of Appalachian Gas Corporation, is made by Ross Holmes, chief engineer of the company, and deliveries of gas to the electric generating station of Central Power and Light Company, located on Devil's River, Texas, commenced immediately. Work on the new line was started early in May, resulting in the unusual achievement in a utility of the production of revenue within sixty days of the commencement of construction operations.

The new line extends from the Eagle Pass natural gas fields of Texas, to Devil's River. Upwards of 10,000,000 pounds of steel pipe were used, and delivered in 212 carloads making up eight special trains.

For the first 47 miles the line is absolutely straight. There are but two gentle curves in the remainder of the line. The pipe was welded by the electric arc process, and for most of the distance is laid about two feet underground. In some places, when crossing hills, the pipe is as much as eighteen feet below the surface. During the course of construction the company built a private road paralleling the pipeline, as well as a private telephone line.

Through the new line Texas Gas Utilities Company, besides supplying on long-term contract the entire fuel requirements of Central Power and Light Company, will also serve natural gas for industrial and domestic purposes in Del Rio and other communities in Maverick, Kinney and Valverde counties.

Two Indiana Companies Seek New Rate Structures

The Rushville Natural Gas Company and the Central Fuel Company, both of Rushville, Ind., have petitioned the Indiana public service commission to assign commission engineers to appraise their property. Both companies desire new rate structures, according to the petition.

New Corporation Formed

Articles of incorporation have been filed with the secretary of state of Indiana by the Lexcastle Oil and Gas Corporation having a principal place of business at Greencastle, Ind. The corporation has an initial capital stock of 2,400 shares having no declared par value and is formed "to develop and operate lands for gas and oil." The first board of directors is composed of F. B. Hillis, Charles Gardner, Otis Gardner, W. E. Pickens, J. W. Dorsett, W. A. Cooper, A. P Stoner, Frank Rogers, Katherine Bauer, W. A. Werneke, Edgar Ashby and E. E Caldwell.

Southwestern Natural Gas Opens Offices in Tulsa

Southwestern Natural Gas Company, a subsidiary of Appalachian Gas Corporation, has opened offices in the Exchange National Bank Building, Tulsa, Okla., and L. E. Farley, formerly of San Antonio, Tex., has been placed in charge, according to announcement of H. G. Scott, president of the company.

Mr. Farley, who is a pipeline operator of many years standing, will have supervision of the company's new 112-mile high-pressure pipe-line connecting the Quinton fields of Oklahoma with Tulsa, Muskogee, Boynton, Sapulpa and other communities, work on which was started last Monday, and which will be in operation in the early Autumn.

Permission Granted to Lay Gas Mains

Permission to lay high-pressure gas mains through a number of down-town park-ways has been granted the Macon Gas Company as a part of its program to install natural gas in that city. Many of Macon's principal streets have park-ways in their centers, and it is through these that the gas company will lay its high-pressure mains rather than tearing up the streets and side-walks of the city. The gas company has promised to replace all shrubbery removed or damaged as a result of the work.

Natural Gas Franchises Awarded

The Public Service Corporation of Nebraska has been given a franchise to serve Minatare, Mitchell and Lyman with natural gas. The gas is to be piped four hundred and twenty-two miles, from the Dumas, Texas field. The service must be ready before September 15, 1931. Some of the towns nearby are already served with artificial gas, but if the Texas gas service proves itself, it is believed that natural gas will be substituted.

Memphis Natural Gas To Build New Pipelines

Announcement was made recently by M. B. Higman, chief engineer of Memphis Natural Gas Company, that construction will commence shortly of a new fifty-mile pipeline to interlink the company's main pipeline with the towns of Leland, Indianola, Morehead, Ittabena and Greenwood, Miss., with the possibility of an additional fifty mile extension, to be constructed at a later date, to hook-up the towns of Carrolton, Winona, Grenada and Charleston, Miss. Surveys for the first fifty-mile line are now being made, and acquisition of right of way is expected to start at an early date.

Memphis Natural Gas Company, in co-operation with Mississippi Power and Light Company, has recently completed preliminary plans and specifications, together with a complete market survey of the new territory to be supplied with natural gas. It is estimated that full load consumption can be secured within three or four years, the daily load at the end of three years being estimated at 4,390,000 cubic feet for the first fifty-mile line.

The new line will tap the company's main 18-inch high-pressure line at a point near Greenville, Miss., present pressures being ample to take care of the additional requirements.

File Articles of Incorporation

Officials of the Southwestern Construction Corporation, an Oklahoma Corporation, have filed papers with the secretary of state of Indiana qualifying the corporation to transact business in Indiana. The company does a general gas pipe line construction business and also builds town plant gas systems. Charles Fry, Cannelton, Ind., has been named agent for service of process. A total of 78 shares of the company's capital stock is represented in Indiana.

File Papers Showing Dissolution of Corporation

Officials of the Indiana Coke and Gas Company of Terre Haute, Ind., have filed papers with the secretary of state of Indiana, evidencing the final dissolution of the corporation.

Apply for Approval of Franchise

The Pavillion, N. Y., Natural Gas Company has applied for approval of local franchise for gas distribution system in Genesee, town and village. If approval is given, the company will extend its gas mains five and one-half miles from Leicester, Genesee village.

Construction of Natural Gas Pipeline Under Way

Construction of a pipeline by the Pacific Gas & Electric Co. which will supply natural gas to the communities of Napa, Sonoma and Marin counties, California, has commenced, on a schedule which calls for completion in ninety days. The project represents an investment of $772,427.

This transmission system for the North Bay communities taps the main line from Kettleman Hills at Crockett, the first unit running across Carquinez bridge and into Vallejo. From Vallejo a 35-mile main will extend to Petaluma, there to tie in with the network that now distributes manufactured gas to a score of cities from Sausalito to Healdsburg.

Extensions will serve the new fuel to many sections that hitherto have not had gas of any kind. This work will require an additional investment of $350,000. One branch will supply Healdsburg, Windsor, Fulton and intervening districts. Another will serve St. Helena, Calistoga, Yountville and adjacent communities. A third will run to the pioneer town of Sonoma, Boyes Springs and neighboring resorts.

Johns Hopkins University Publishes Original Investigation of Importance to Gas Industry

"The Origin and Decomposition of Organic Sulfur Compounds Under Gas Making Conditions with Particular Reference to the Role of Carbon Sulfur Complex" by John Cromwell Holtz, Ph. D. has recently been published by The Johns Hopkins University, Baltimore, Md. This work, prepared in the Department of Gas Engineering, comprises in its original form 130 typewritten pages, a number of figures and curves, and 131 references to original literature. Price per copy is $1.00.

Change of Ownership

The United Gas Corporation through its subsidiary the United Gas Company has acquired control of the Northern Texas Utilities Company, which owns natural gas rights on a large acreage in the Amarillo Texas fields.

Sell 1,000 Acres of Leases

A contract between the Blackwell Oil and Gas company of Cushing, Oklahoma, and the River Valley Gas Development company of Delaware, Md., has been filed with county officials of Johnson county, Arkansas. The contract shows that the Oklahoma company has sold 1,000 acres of leases to the Delaware company with a contract for the eastern company to drill a gas well in which the Blackwell company retains one-eighth overriding interest in the royalty, the Western Coal and Mining company receives an eighth and the River Valley Gas company six-eighths. The Blackwell company reserves all oil rights in the well.

In the contract the Blackwell company sold gas from the Winn well, located three-quarters of a mile from the leased land mentioned in the contract, to the River Valley company for eight cents a thousand cubic feet at the well, but did not sell the well. The Blackwell Oil and Gas Company owns about 10,000 acres of leases in the Coal Hill field.

Convention Calendar

September

9-12 Pacific Coast Gas Association Hotel Huntington, Pasadena, Cal. Clifford Johnstone, 447 Sutter St., San Francisco, Cal., secretary.

18-19 Empire State Gas & Electric Association, Saranac Inn, N. Y. C. H. B. Chapin, Grand Central Terminal, N. Y. C., secretary.

23-24 Indiana Gas Association, Annual Convention, French Lick, Ind. F. W. Budd, Muncie, Ind., secretary-treasurer.

October

13-17 American Gas Association, municipal auditorium, Atlantic City, N. J. Alexander Forward, 420 Lexington Avenue, N. Y. C., managing director.

Authority Granted to Purchase Gas Property

The Indiana public service commission has issued an order authorizing the Northern Indiana Power Company of Kokomo, Ind., to purchase the Sheridan Gas Utilities Company at a cost of $40,000. In addition to a plant at Sheridan, Ind., the company has franchises to supply gas to Rockville, Danville and Plainfield. The former two cities will be on the main line of a natural gas line company between St. Louis and Indianapolis but thus far the pipe line company has not applied for a certificate for service to the two cities.

Purchase of Stock Authorized

Authority has been given the Southern Indiana Gas & Electric Company of Evansville, Ind., to purchase the stock of the Boonville (Ind.) Electric Light and Power Company and the Newburgh (Ind.) Light and Water Company for $516,750.

Texas Gas Utilities To Transport Gas to Mexico

The work of laying the new Chittim Field-Eagle Pass natural gas pipeline of Texas Gas Utilities Company, subsidiary of Appalachian Gas Corporation, was commenced yesterday, according to Ross Holmes, chief engineer. Inception of operations inaugurates the second project in the company's main pipeline construction program, the first being the Chittim Field-Devil's River line.

The line now being built will run through the new $6,000,000 Maverick County irrigation project en route to Eagle Pass, continuing on to the middle of the International Bridge, where present plans call for the delivery of natural gas in the city of Piedras Negras through a Mexican distributing company, or else continuation of the line by the company into Mexican territory.

Piedras Nagras is one of the more important Mexican border cities, having a population of about 20,000 and a number of industries. At present the sole sources of heat are kerosene and wood, no gas being available.

Present plans call for the completion of the new line by Sept. 1.

Gas Engineering Course at Johns Hopkins Makes Progress

In a report issued by the Department of Gas Engineering of the Johns Hopkins University for the year 1929-1930 it is stated that Dr. Lloyd Logan was added to the staff as Associate Professor and Mr. Elliott, a graduate student and Mr. Bittinger, an advanced student, were engaged to assist in research work during the summer.

The enrollment for the year was made up of thirty undergraduate and three graduate students, a total of thirty-three. Two new scholarships were established, making a total of nineteen. Three Doctor's and seven Bachelor's degrees were awarded. New students are urgently needed to replace graduates.

The research work of the Gas Engineering Department developed into plant operations during the year and new research projects are now under way. The American Gas Association is cooperating with this work and much material published is now available to the gas industry.

Frequent consultation service was rendered. This service, a valuable feature of The Hopkins Gas Engineering Course, is now available to the gas industry.

The purchase of a truck facilitated the field work and made it more interesting and valuable.

The Advisory Committee has reported that pledges amounting to approximately $78,000 have been secured for the five-year period, 1929-1934.

(*News continued on page 84*)

Rapid growth of GAS INDUSTRY *demands permanent construction*

Cast iron for pipe! Rubber Rings for joints!

Photograph shows the Southwestern type rubber ring for B. & S. Joints. Can be furnished also for repairing joints in existing mains.

Growth of the gas industry is one of the business romances of modern times.

With thousands of miles of pipe lines beneath city streets, nothing but the best material is worthy of consideration by the gas engineer. Gas leakage from deteriorated mains not only is costly, but dangerous.

There is but one material for gas mains that is known to last for centuries . . . cast iron. It rusts only on the surface, not in pits or holes. After the first coating of rust, further corrosion stops. It solves the coating problem by NOT NEEDING any coating.

Now, the combination of cast iron pipe and rubber ring joints gives the gas industry the COMPLETE permanent construction it needs for distribution lines. Clow-National will furnish any type rubber ring desired. Additional information gladly furnished.

James B. Clow & Sons
Chicago, Illinois

National Cast Iron Pipe Co.
Birmingham, Alabama

CLOW-NATIONAL
CAST IRON PIPE
"Everything for a Pipe System"

Domestic Gas Appliance Course

The Testing Laboratory of the American Gas Association, at Cleveland, Ohio, during the week of June 16 was headquarters of an intensive training course in the design, operation, and servicing of domestic gas appliances.

The entire week was devoted to lectures and demonstrations of appliance operation; social functions were arranged in the evening, including a banquet and a sight-seeing trip through the business and residential districts of Cleveland.

Class attending Domestic Gas Appliance Course at the A. G. A. Laboratory

Included among the forty men and women who registered were seventeen home service workers and directors, seventeen service men, three gas engineers two college teachers—Miss Daisy Davis, of Ohio State University, and Miss Cora E. Swingle, of Texas State College for Women—and one public health official, Dr. Wilmer H. Schulze, of the Baltimore Health Department. Dr. Schulze is chief of the Division of Chemical Technology and directly in charge of enforcing the ordinance which limits the sale and installation of gas appliances in Baltimore to those which have been tested and approved for safety and operation.

Opening remarks as the course began were made by R. W. Gallagher, president of The East Ohio Gas Company, who briefly summed up the accomplishments and potentialities of various branches of the gas industry. Lectures on appliances by Laboratory engineers were interspersed during the entire week with talks of general interest given by prominent gas men and women.

Missouri-Kansas Pipeline to Launch Drilling Program

To assure an ample flow of gas in advance of completion of the company's cross-country pipe line, the Missouri-Kansas Pipe Line Company has launched an active development and drilling program in the Texas Panhandle and the Hugoton area of southwestern Kansas. Six wells are being drilled in the Panhandle at the present time and eight are under way in the Hugoton field. The work is being carried on by a subsidiary, Texas Interstate Pipe Line Company and associated interests.

These activities represent the initial steps in the company's plan to have from six hundred to eight hundred million cubic feet of open flow available by December 1, the date of completion of the natural gas pipe line which will extend eastward from the gas fields through Missouri, Illinois and into Indiana.

In the acquisition of gas properties in the Panhandle and Hugoton areas, which approximate 180,000 acres at the present time, Missouri-Kansas obtained five completed gas walls, either in whole or in part, having open flow volumes ranging from five to forty-two million cubic feet each. The development program is being carried on only in proven gas areas.

Southwestern production is under the direct supervision of Everett Carpenter of the Texas Interstate company with headquarters at Amarillo, Texas. General operating headquarters of the company are in the recently completed Fairfax Building at 101 West 11th Street, Kansas City, Missouri .

The Granting Of Franchises In Colorado

When a municipality wishes to grant a franchise to a privately owned public utility, a vote of the taxpayers is not necessary, according to a ruling made by Assistant Attorney General Arthur L. Olson, of Colorado, to City Attorney Herschel Horn of Lamar, Colorado. A city ordinance properly drawn is all that is necessary under such circumstances. However, where the municipality is to build or purchase the utility for operation, a vote is necessary.

Consolidated of New York Lowers Gas Rates

A new and lower schedule of gas rates, which will mean a substantial saving to customers using gas to heat their homes, and which is expected to extend this automatic house heating service to many additional customers, went into effect on August 1, in the territory served by the Consolidated Gas Company of New York and affiliated gas companies.

Besides the Consolidated, these companies include the Standard Gas Light Co., New Amsterdam Gas Co., The East River Gas Co., Central Union Gas Co., Northern Union Gas Co., New York & Queens Gas Co., The Astoria Light, Heat & Power Co., Bronx Gas & Electric Co., and the Westchester Lighting Co.

The rates are optional, since the customer has the privilege of choosing either the new schedule or the rate used for general purposes.

While the new rates for house heating are considerably lower than those previously in effect, the form of the rate will remain unchanged. It is available to every customer whose heating requirements are at least sixty per cent of his total annual gas consumption.

The rate is in two parts, the first being an annual radiation charge payable in six monthly installments beginning with the November 1 bill. This charge is based on the amount of radiation required for the premises, and remains the same in the new rate as in the old, namely, twenty cents for each square foot of radiation.

Part two of the rate is a straight charge for the gas used as measured by the meter. This amounts to six cents a hundred cubic feet, which is a twenty per cent reduction or more below the former rate.

This reduction in house heating rates is the third that the Consolidated Gas Company and affiliated gas companies have made within a period of three years. The first reduction was made in September, 1927, and the second was made in September, 1929.

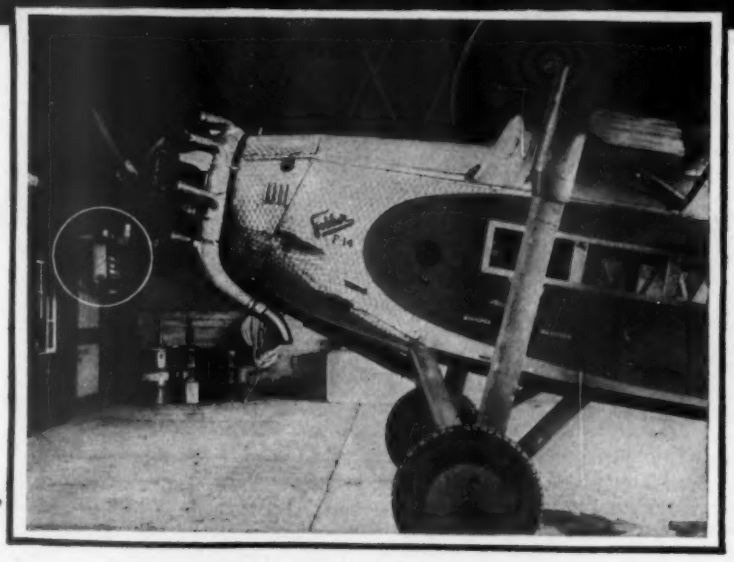
The new schedule is in line with the Consolidated Company's policy of reducing rates whenever possible to further the use of its services, and is the direct result of a study made by the company of the house heating and large building heating field. This survey revealed that the average home-owner appreciates the convenience of automatic gas heating, provided the cost is not greatly in excess of what he has been accustomed to pay for crude and solid fuels, stored on the premises.

At the present time there are more than 1450 house heating customers on the lines of the Consolidated Company and its affiliated companies in New York and Westchester County.

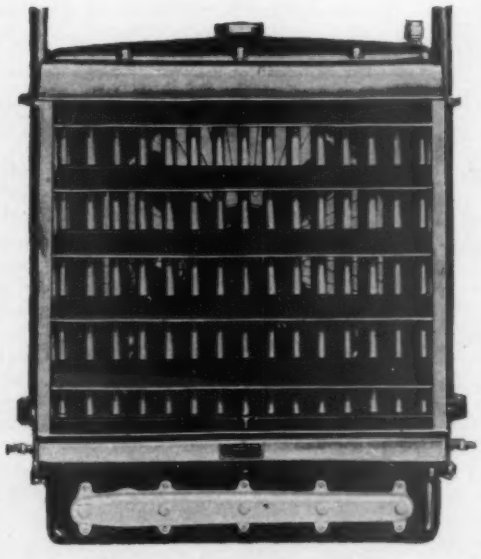
(*News continued on page 84*)

The Humphrey Gas UNIT HEATER

. . . For Temperamental Temperatures



Interior view of airplane hangar at Calgary, Alberta, Canada, which is heated with Humphrey Gas Unit Heaters. Forty degrees below zero is a common temperature during the winter months in Calgary.



You can't control extreme temperature ranges from a central heating plant with any degree of certainty. You *can* control them efficiently and economically by using Humphrey Gas Unit Heaters. These modern heating units are spotted throughout the building at scientifically determined intervals. They burn gas—the most flexible, convenient and economical of all fuels for the purpose. They give you instant heat, where and when you want it. They decrease your heating costs and increase the efficiency of your workmen by keeping them comfortable at their tasks. May we send you a catalog?

GENERAL GAS LIGHT CO.
KALAMAZOO, MICHIGAN
New York • Pittsburgh • Cleveland • San Francisco

New Graduate Course in Fuel Technology

With the needs of the gas industry in mind, and the realization of the part which must be played by engineers who are especially trained in fuel technology Columbia University, through University Extension, offers two new graduate courses in fuel technology. These courses aim to treat from the chemical engineering standpoint, and in a post graduate manner, the applications of scientific principles in the production, liquid, and gaseous fuels. The subject distribution, and utilization of solid, matter is introduced mainly by assigned reading in textbooks and in technical periodicals. The classroom periods are used for lecture and class discussions of the material in the assigned readings and of problems involving calculation and design. Both courses are open to qualified students on the approval of the instructor. While it is advised that they be taken in the sequence given, either course may be taken alone.

The first course, Fuel Technology I, deals with solid and gaseous fuels, and is given on Friday afternoons from 4:10 to 6:00 during the winter session, beginning Sept. 26, 1930. Topics treated in the course include, theory of combustion with special reference to solid and gaseous fuels; carbonization of coal at low and high temperatures; production and purification of gaseous fuels; storage and distribution of city gas; utilization of fuels including temperature measurement, furnaces and fuel appliances, heat balances, and fuel efficiencies; public utilities and their relation to the fuel question.

The second course, Fuel Technology II, deals mainly with petroleum, and is given Friday afternoons from 4:10 to 6:00 during the spring session, beginning Feb. 6, 1931. It treats in general of the importance, origin, and occurrence of fuels, and in particular of the winning, refining, and marketing of petroleum and its products. It includes discussions of the theories of heat transfer, of condensation, and of cracking of hydrocarbons in their applications to refinery practice; petroleum and natural gas as chemical raw materials; oil shales and other sources of liquid fuels; and the utilization of liquid fuels.

Both courses are conducted personally by Professor J. J. Morgan, of the Chemical Engineering Department.

A. G. A. Nominating Committee Announce Names to be Presented for Election at Annual Meeting

The Nominating Committee of the American Gas Association will present the following names for election at the Annual Meeting of that organization in Atlantic City, N. J., October 13-17.

For President—Clifford E. Paige, Vice-President, The Brooklyn Union Gas Co., Brooklyn, N. Y.

For Vice-President—R. W. Gallagher, President, The East Ohio Gas Co., Cleveland, Ohio.

For Treasurer—W. J. Welsh, President, New York and Richmond Gas Co., Staten Island, N. Y.

Directors—Two-Year Terms: Walter C. Beckjord, Vice-President, The Boston Consolidated Gas Co., Boston, Mass.; J. D. Creveling associate manager natural gas and gasoline division, Henry L. Doherty Co., New York, N. Y.; Raymond Cross, President, The Ohio Fuel Gas Co., Columbus, Ohio; Henry L. Doherty, President, Cities Service Co., New York, N. Y.; Oscar H. Fogg, Vice-President, The Consolidated Gas Company of New York, New York, N. Y.; Samuel Insull, Jr., President, Midland United Co., Chicago, Ill.; F. A. Lemke, Secretary and Treasurer, Humphrey Company, Kalamazoo, Mich.; A. E. Peirce, President, Central Public Service Corp., Chicago, Ill.; and Arthur Stockstrom, Secretary, American Stove Co., St. Louis, Mo.

The following members have been nominated by Section Nominating Committees to serve as section officers for the next association year:

Accounting Section: Chairman—John I. Blanchfield, Brooklyn Union Gas Co., Brooklyn, N. Y.; Vice-Chairman, Wm. A. Doering, Boston Consolidated Gas Co., Boston, Mass.

Commercial Section: Chairman—E. R. Acker, Central Hudson Gas & Electric Corp., Poughkeepsie, N. Y.; Vice-Chairman, Samuel Insull, Jr., Midland United Co., Chicago, Ill

Industrial Gas Sections: Chairman—D. W. Chapman, Peoples Gas Light & Coke Co, Chicago, Ill; Vice-Chairman, A J. Peters, Consolidated Gas Company of New York, New York, N. Y.

Manufacturers Section: Chairman—E. S. Dickey, Maryland Meter Works, Baltimore, Md.; Vice-Chairman, David B. Kahn, Estate Stove Co., Hamilton, Ohio.

Publicity and Advertising Section: Chairman—Donald M. Mackie, Commonwealth & Southern Corp., Jackson, Mich.; Vice-Chairman, R. E. Haas, Columbia Gas & Electric Corp., New York, N. Y.

Technical Section: Chairman—R. G. Griswold, Cities Service Co., New York, N. Y.; Vice-Chairman, I. K. Peck, Midland United Co., Chicago, Ill.

Brings In Big Gas Well

Early in July the Capitol Gas Company brought in a gas well in the Baker-Glendive field of Montana making twenty-eight million cubic feet of gas with a rock pressure of 205 pounds. This well is located a quarter of a mile from the twenty-six million cubic feet gasser of the Minnesota-Northern Power Company.

Polytechnic Institute Gas Engineering Course Enters Its Fourth Year

The completion of the Gas Engineering course by the third class in May of this year brings the total number of gas company employees to successfully pass the course requirements to one hundred and thirty (130).

The fourth year of the course will start October 2 with the same general purpose which the past has proven to be sound. The material of the course is arranged and scheduled primarily to lay before the student, in logical sequence, the general principles involved in the manufacture, distribution and utilization of gas. The subject matter of the course is presented in a series of twenty-six lectures delivered by men of long experience in their respective fields. Lectures are given in the physical and chemical properties of gases; the manufacture and purification of coal and water gas and a study of the equipment involved; distribution system design, operation and maintenance; gas measurement; the chemistry of combustion; industrial furnace types and control of combustion; domestic appliances and gas company organization and public relations. These lectures are supplemented by timely inspection trips to gas plants and manufacturing plants using gas in production work.

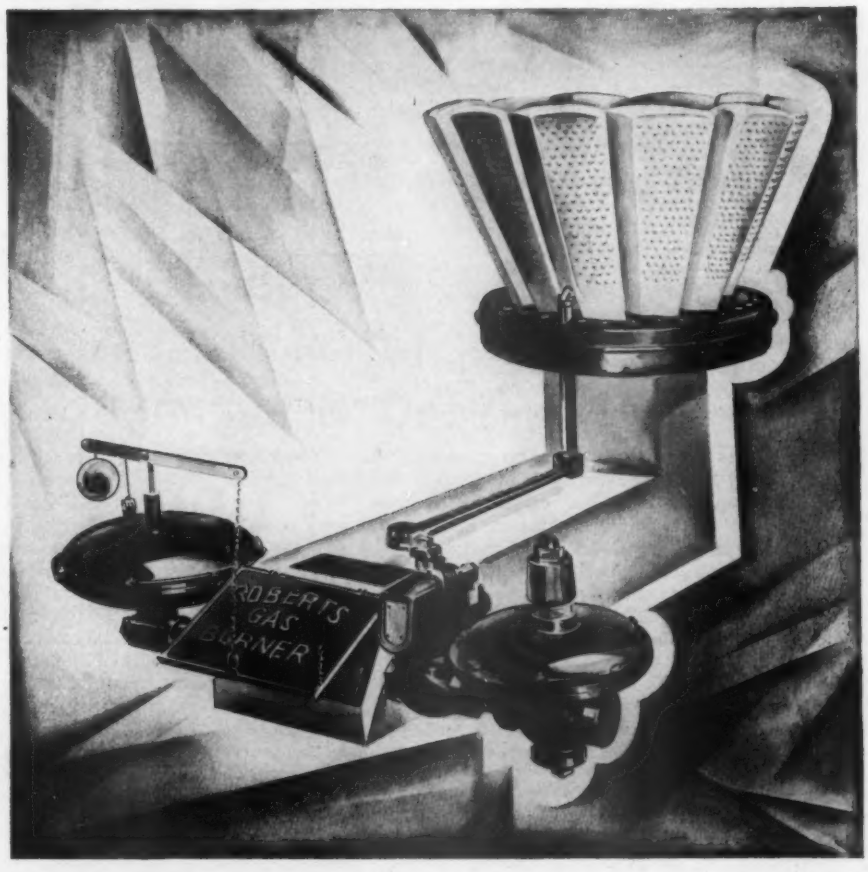
Twenty-two laboratory sessions of 2½ hours duration are scheduled in conjunction with the lectures. The last seven sessions of laboratory work are concerned with the utilization of manufactured gas and includes such interesting studies as gas furnace manipulation and testing, explanation and test of a gas fired refrigerator unit, etc.

This course is given during the evening and is open to employees of gas companies and related industries who have had the equivalent of high school training in Chemistry, Physics and Algebra. Application and any information regarding the course may be obtained from Professor E. F. Church, Jr., Head of Department of Mechanical Engineering, Polytechnic Institute of 99 Livingston Street, Brooklyn, N. Y.

Permission Sought to Transfer Property

The Iroquois Gas Corporation of Buffalo, N. Y., and the Harvest Gas and Oil Company of Orchard Park has jointly applied for permission to the transfer by the Harvest Company to the Iroquois Company of its property and franchise in Orchard Park and Hamburg. The petition states that the wells of the Harvest Company do not produce gas in sufficient quantities to furnish proper service to the public in extremely cold weather and that it is burdened with financial problems which make it difficult to operate the plant in a satisfactory manner. The price agreed upon is $22,500.

Why be content with less than the Roberts?



ARE you selling your customers the best in gas heating equipment?

Does the Conversion Burner which you offer them include in its construction these very essential features?

1. China Clay Radiants, that direct and drive the heat to the point where it can be most efficiently utilized.
2. Drawn Steel Venturi Mixers, the smooth finish permitting at least 30% higher air injection.
3. 1¼" manifold assuring an abundant supply of gas to the burner.
4. Roberts Diaphragm Air Control with delayed action, which gradually admits the air to the burner, thus eliminating excess noise.
5. 1¼" Minneapolis Motor Gas Valve.
6. 1¼" Equitable Spring Type Gas Governor.
7. Johnson Adjustable Cock to each mixer.
8. Secondary Air Duct made of Armco Iron. Air cooled castings assuring longer life. Air supply controlled and delivered to the point of combustion.
9. Roberts Safety Pilot with lava stem and cap having all electrical contacts on outside where they are accessible.
10. Minneapolis Controls.

Demand the Roberts features when looking for a conversion burner. After you have satisfied yourself that you are getting the best, then standardize on the Roberts Controlled Gas Heating Unit. Be content with none less.

Send for complete new booklet showing methods successfully used by some of the country's foremost gas companies in the merchandising of gas for home heating. Ask for book entitled "Sell Health and Comfort in the Home"—yours for the asking.

ROBERTS-GORDON APPLIANCE CORPORATION

DELAWARE AVENUE AT TUPPER STREET

CURTISS BUILDING BUFFALO, N. Y.

ROBERTS CONTROLLED GAS HEATING UNIT

PERSONALS

F. M. Banks has been appointed General Superintendent of Sales of the Southern California Gas Company, Los Angeles. Mr. Banks was Sales Supervisor for some years in the Eastern Division of the company and was then sent to the newly organized San Joaquin Valley Division as manager. Mr. C. M. Eyman succeeds Mr. Banks as manager of the San Joaquin Valley Division.

D. B. Shepherd has been appointed Assistant to the Gas Superintendent of the Eastern Division of the Virginia Public Service Company, Newport News, Va.

A. Bailey, formerly general foreman of the gas shop of the Los Angeles Gas and Electric Company, is now connected with the Coast Counties Gas Company, Santa Cruz, California in the capacity of gas engineer.

G. T. Koch, formerly Assistant Superintendent of compressor stations of the Ohio Fuel Gas Company, Columbus, has been promoted to Superintendent of Compressor Stations. In his new position Mr. Koch will be responsible for the operation of the compressor stations and drying plants of the Columbus Operating Group.

J. H. Lang was recently appointed Superintendent of the Measurement Department of the Columbus, Ohio, Operating Group of the Columbia Gas and Electric System. Mr. Lang was formerly assistant superintendent of the Measurement Department. In his new position Mr. Lang will have charge of all measurement of gas and will operate the Central Repair Shop at Mount Vernon.

Howard A. Lockhart succeeds George McCaffrey as Assistant Superintendent of Works of the Fall River, Mass., Gas Works Company. Mr. Lockhart was formerly connected with the Lowell Gas Light Company. Mr. McCaffrev is now Plant Superintendent of the Stamford Gas and Electric Company, Stamford, Connecticut.

Robert D. Stuart, Jr., formerly industrial sales manager of the Fall River Gas Works Company, Fall River, Mass., has been made Sales Manager. Mr. Stuart has been with the company since 1927, coming from the Pawtucket division of the Blackstone Valley Gas and Electric Company.

Thomas W. McKenna recently accepted the position of Industrial Sales Manager of the Wilmington, Delaware, Gas Company. Mr. McKenna was formerly Industrial Service Engineer of the Fall River, Mass., Gas Works Company.

R. A. Whitney, formerly Construction Engineer of the Public Service Company of Northern Illinois, Chicago, has been appointed Building Engineer, a newly created position. H. C. Kalwitz, formerly Assistant Construction Engineer, succeeds Mr. Whitney as Construction Engineer.

H. U. Greene has recently been promoted to General Manager of the Cambridge, Mass., Gas and Electric Company.

N. Harlow North, advertising manager was recently made assistant sales and advertising manager of the Fall River, Mass., Gas Works Company.

Scott Turner, Director of the United States Bureau of Mines represented the American Institute of Mining and Metallurgical Engineers at the annual meeting of the Institution of Mining Engineers held at Birmingham, England, July ninth to twelfth.

S. A. Chadwell, formerly Superintendent of Compressor and Drying Plant construction for the Columbus, Ohio, group of the Columbia Gas and Electric System, has been promoted to the position of General Superintendent of Main Lines.

Mr. Chadwell was first employed by The Ohio Fuel Gas Company to assist in the construction of Wheeler Compressor Station in 1912. At the completion of this work he was employed by the Logan Gas Company in a similar capacity. In the year 1913 he was re-employed by The Ohio Fuel Gas Company to assist in the construction of compressing stations. He continued this work until 1918

In his present position he will have full charge of the operation, maintenance and construction of transmission main lines.

E. M. Tharp has been promoted to the position of Assistant General Manager of the Columbus Operating Group of Properties, Columbia System. Mr. Tharp will retain his office in Columbus, Ohio.

E. A. Clark, formerly connected with the Oklahoma Natural Gas Co. of Tulsa, Oklahoma, has been elected Vice President of the Charleston Operating Group of Columbia System, with headquarters at Charleston, W. Va. Mr. Clark has been active in the gas and oil industry for many years. He is a native of Pennsylvania but for several years has been connected with the Mid-Continent Fields in Oklahoma, Kansas and Texas.

William W. Odell, who was connected with the United States Bureau of Mines for a period of twelve years in the capacity of Gas Engineer and Fuels Engineer, has joined the staff of Columbia Engineering and Management Corporation, New York office, and is engaged in working out various gas problems.

D. L. Scott, Manager Public Relations of the Los Angeles, Calif., Gas & Electric Corporation, was recently unanimously chosen President of the Advertising Club of Los Angeles.

Allan C. Davey has been appointed supervisor of merchandise sales and new business development of the Wisconsin Public Service Corporation, Milwaukee, Wis. The position is a newly created one.

Van Brunt Seaman, who has been a representative in the Customer-Ownership Department of Henry L. Doherty and Company, has been named sales manager of the Henry L. Doherty securities department at Cincinnati, Ohio, according to a recent announcement by S. B. Irelan, manager of the Customer-Ownership Department.

Ormrod Titus, formerly purchasing agent at Rochester, has been promoted to general manager of the Western division, New York State Electric and Gas Association. Mr. Titus will make his headquarters at Lancaster, N. Y.

N. H. Coit was recently appointed Vice-President of the Broad River Power Company, Columbia, S. C. Mr. Coit was formerly general manager.

A. Emory Wishon was recently elected president of the San Joaquin Light and Power Corporation and the Midland Counties Public Service Corporation. Mr. Wishon was also elected vice-president and assistant general manager of the Pacific Gas and Electric Company.

Mr. Wishon's promotion in the San Joaquin and Midland Countries companies and his election to a post of high authority with the Pacific Gas and Electric Company was the first important personnel change to be made since the stock exchange transaction by which Pacific Gas acquired control of the California properties of the North American Company.

R. M. Sayre, new business representative of the Kansas City, Mo., Gas Company, has been announced winner of the first prize of $150 offered to the new business representative of the Gas Service Company making the greatest number of group sales from the first of the year to July 1st.

Ralph C. Wheeler, district auditor for the Central States Gas Company has been promoted to manager of the Princeton (Ind.) Utilities Company and the Princeton Water Company. The former is the gas utility for Princeton. Announcement of the appointment was made at Vincennes, Ind., at a meeting of the Central Public Service employees.

Mr. Wheeler will succeed J. W. Joplin, who is retiring because of ill health. Martin L. Ross will succeed Mr. Wheeler as district auditor. The changes became effective Aug. 1. Mr. Wheeler has been with the company seven years.

L. C. Farley, formerly of San Antonio, Texas, a pipeline operator of many years standing, has been elected assistant sec-

(*Personals continued on page 88*)

ANNOUNCING A MUELLER GAS-ERA FURNACE

Pressed of Steel

Combining Price Appeal with Mueller standards of High Quality, Dependability and Efficiency . . . . . .

A gas-fired warm air furnace by Mueller, embodying the same advanced principles of corrugated ribbed heating surface as the Mueller Gas-Era cast furnaces. Hot gases pass over these ribbed sections at high velocity, securing maximum operating efficiency.

Constructed of heavy-gauge, pressed, copper-bearing sheets, machine welded . . . . casing attractively finished in green lacquer. Designed to sell at a price without sacrificing quality or efficiency.

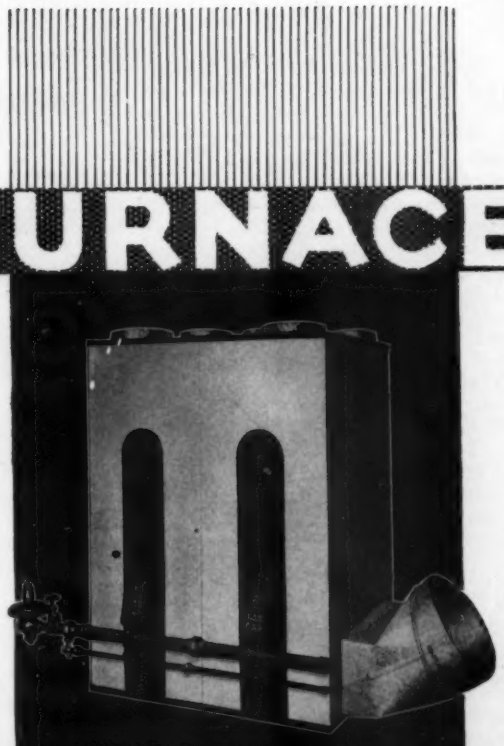
Standardization of parts and packing greatly simplifies stocking, pricing and installation. Whenever a stock is carried, no extra parts are required. *It is only necessary to ship a complete individual package for each increasing section, regardless of size of furnace.* Only one stock of parts necessary for furnaces of any capacity.

Investigate this revolutionary gas-fired furnace. Mail the coupon for details.

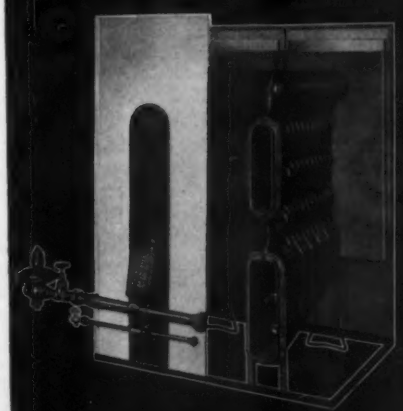
L. J. MUELLER FURNACE CO., 187 Reed St., Milwaukee, Wis.

Makers of the complete line of Gas-Era Gas-Fired Furnaces and Boilers.

Approved in all sizes by American Gas Association, Inc., Testing Laboratories ... capacities in multiples of 45,000 to 450,000 B. t. u's.



Multiple unit construction permits use of the number of standard sections required to secure correct capacity for any installation. Note the trim, clean-cut lines. Stands only 53 inches high.



Illustrating Mueller ribbed, serpentine type heating sections, which assure maximum efficiency.

THE COUPON IS FOR YOUR CONVENIENCE

L. J. MUELLER FURNACE CO.,
187 Reed St., Milwaukee, Wis.

Catalog, prices, and full details, please, regarding the new Mueller Pressed Steel Gas-Era Furnace.

Firm Name.....

Address .....

Name and title of individual making request

MUELLER

retary of Southwestern Natural Gas Company, subsidiary of Appalachian Gas Corporation, according to announcement by H. G. Scott, president of the company.

Mr. Farley, who also holds the post of manager of Southwestern Natural Gas Company, has headquarters in Tulsa, Okla., whence he is supervising construction of the company's new 112-mile high-pressure pipeline, connecting the Quinton natural gas fields of Oklahoma with various cities and towns in the eastern part of the State, including Tulsa, Muskogee, Boynton, Sapulpa and Sand Springs.

Alfred H. White, head of the Chemical Engineering Department of the University of Michigan was signally honored when the Michigan Gas Association elected him president for the coming year. The honor thus conferred is unique in the thirty-seven years history of the organization for it is the first time that a person not actively engaged in the gas industry has been elected president.

Prof. White graduated from the University of Michigan in 1893. He taught three years at the University of Illinois and studied a year at the Federal Polytechnic Institute in Zurich, Switzerland before returning to the University of Michigan as instructor in chemical technology.

Two years later the Michigan Gas Association, on the initiative of Henry T. Walbridge, then manager of the Detroit City Gas company, and Henry W. Douglas of the Washtenaw Gas company, instituted a cooperative program with the University of Michigan to encourage students desirous of becoming gas engineers and to promote research work in related fields. It was recognized that specialized work in gas engineering should be undertaken only as a graduate course and the first holder of this fellowship was Herman Russell, now president of the Rochester Gas and Electric Corporation.

The relationship thus commenced in 1900 has been maintained continuously, except for an interruption during the World War period. This fellowship in gas engineering supported at the University of Michigan by the Michigan Gas Association is the senior industrial fellowship in the United States.

During the 30 years, Professor White has sent out from the Chemical Engineering Department of the University of Michigan hundreds of gas engineers to take responsible positions in the gas industry, including 27 holders of the Michigan Gas Association fellowship.

Gertrude Smale of Pontiac and George R. Bean of Saginaw, both employees of Consumers Power Company, were presented with the McCarter Medal for lifesaving by resuscitation at the joint session which opened the conventions of the Michigan Gas Association and the Michigan Electric Light Association at the Grand Hotel, June 30.

TRADE NEWS

United Engineers & Constructors, Inc., Activities

The Macon Gas Company of Macon, Georgia, has awarded contract to furnish, deliver and install 4100 ft. Dresser main, 12″; 3000 ft. of 6″ welded steel main, 600 ft. of 10″ welded steel main, 18,500 ft. of 12″ Dresser main; 9300 ft. of 6″ welded steel main, 9000 ft. of 10″ welded steel main, and 500 ft. of 8″ welded steel main, at Macon, Georgia. The Allentown-Bethlehem Gas Company, of Allentown, Pa. has awarded contract to furnish, deliver and install 4700 ft. of 8″ welded steel main, 5280 ft. of 4″ welded steel main and 9000 ft. of 2″ galvanized screw main between Buttstown and Miller Heights, Penna. also contracts to furnish, deliver and install 8100 ft. of 6″ welded steel main between Bethlehem and Butztown, Penna. and furnish, deliver and install 3800 ft. of 8″ welded steel main, 6100 ft. of 6″ welded steel main, 39,000 ft. of 4″ welded steel main, and 10,560 ft. of 2″ galvanized screwed main, between Bethlehem and Bath, Penna.

The Sun Oil Company through its subsidiary the Susquehanna Pipe Line Company, has awarded contract for the building of 200 miles of 6″ welded steel pipe line from Reading, Pa., to Syracuse, N. Y. This line will be used for pumping gasoline.

General Refractories to Open Sales Office in Birmingham

General Refractories Company, announce the opening of a new district sales office in Birmingham, Ala., on July 15th. This office is located in the Empire Building and is in charge of Mr. Walter S. Stapler. This new office will enable the General Refractories Company to more adequately serve refractory users in the south eastern territory.

Johnson Gas Appliance Co. Appoints Eastern Representative

The Johnson Gas Appliance Company, Cedar Rapids, Iowa, have appointed the Eastern Service Co., 250 Stuart St., Boston, Mass. to represent the Johnson Gas Appliances throughout the East. This concern, who are sales agents and engineers for other gas appliances, will carry a complete stock of Johnson appliances. R. M. Henshaw, former representative, will be connected with the Eastern Service Co.

Inertol Company Establish Branch Office in San Francisco

The Inertol Company, Inc. of New York announces the opening of a branch office in San Francisco. Mr. B. W. Mueller has been appointed Western Manager and is in charge of the office which is located at 447 Sutter St. in the Division Building of the Pacific Gas & Electric Co. The company manufactures Imunol for the protection of Gasholders.

Production in New Republic Steel Mill Approaching Full Capacity

Operations of the first of the new Republic Steel Corp. electric pipe welding mills to be placed in production are rapidly approaching full capacity, company officials announced recently. The second unit being installed in the $8,000,000 electric pipe mill program at Youngstown will be completed shortly.

Orders are on the books and business is in sight for capacity operations for the remainder of the year. Production is now going forward on a 50,000-ton order for the Phillips Petroleum Co. for a long distance gasoline pipeline from Texas to St. Louis. The first of the new mills is turning out pipe of 8⅝ inches to 16 inches diameter.

Officials of the company are gratified with the progress being made in getting the new mill into large scale commercial production. After some minor adjustments have been completed the mill will be ready for 24-hour operation.

Two New Linde Air Products Pamphlets

The Linde Air Products Company, 30 East 42nd Street, New York, N. Y. has recently published two new pamphlets as a part of Linde Process Service.

"Outline Training Course for Aircraft Welders" is an outline of instructions for aircraft welders based on procedure control. This training course applies the principles of procedure control to aircraft welding, and also outlines qualification tests for aircraft welders.

"Production Welding" illustrates and describes the application of the oxy-acetylene process as a production method in a number of the more important industries It shows clearly the application of procedure control in production operations.

(*Trade News continued on page 90*)

Decide now · Get Your JANITROL Prospects to say "yes" this Summer

Grab your phone and start calling—you will find prospects—plenty of them—willing to talk about winter heating problems right now—even though these summer days are sweltering . . .

. . . summer is a good time to sell JANITROL. Fuel Bins are empty. Basements are in an orderly condition. Owners are open-minded.

Many Gas Companies are installing JANITROL during the summer months through special offers, such as (1) small down payments; (2) interesting discounts off advertised prices for July and August installations; (3) furnace thoroughly cleaned free of charge with every JANITROL installation; and (4) an offer of another load building appliance, such as radiant fire, free with each JANITROL installation.

There are many other ways to sell JANITROL. Merchandising plans, ready for special application in your territory, formulated to help you build good will and a profitable load with JANITROL, are available for the asking.

Electrotypes of these illustrations may be had for use in your own advertising of JANITROL. They are appropriate for newspaper and direct mail publicity. Copy suggestions for these electrotypes will be mailed, if you so desire.

The Surface Combustion Co.
INCORPORATED
Subsidiary of Henry L. Doherty & Co.
2375 DORR STREET, TOLEDO, OHIO
Branch Offices in All Principal Cities
Mantle Recuperator Division — Webster Engineering Co
Member of Industrial Furnace Manufacturers Association

Surface Combustion Announces Fall Campaign

There is now available for the use of gas companies, the third of a series of merchandising campaigns. This material, which is in folio form, stresses the Fall season as the proper time to install Janitrol—a conversion burner manufactured by the Surface Combustion Company, 2375 Dorr Street, Toledo, Ohio. The dominant theme of selling gas as a domestic fuel is continued in this campaign as in the others under a headline reading, "When Nights Get Nippy and Frost Lingers in the Morning Air."

Copies are available for those interested and may be secured by writing the Advertising Department, Surface Combustion Company, 2375 Dorr Street, Toledo, Ohio.

New Prest-O-Lite Plant in Wyoming

The Prest-O-Lite Company, Inc., 30 East 42nd Street, New York, N. Y., has placed in operation a new plant for the manufacture and distribution of dissolved acetylene at Casper, Wyo. The new plant has been built to accommodate the increasing need of users of the oxy-acetylene welding and cutting process in this region. The plant is located on a private siding of the Chicago Burlington and Quincy Railroad, and the address is 648 Bryan Stock Trail, Casper, Wyo.

A. F. Ericson Appointed Manager of New San Francisco Office of Minneapolis-Honeywell Co.

Announcement is made of the appointment of Arthur F. Ericson as manager of the new San Francisco office of the Minneapolis-Honeywell Regulator Company. At the head of his own company, the Arthur F. Ericson Company, he has distributed Minneapolis-Honeywell products on the Pacific coast for the past five years.

Mr. Ericson brings to his new position a fund of practical and technical engineering experience.

Barber Gas Burner Co. Issue Attractive Sales Presentation Book

The Barber Gas Burner Co., formerly The Cleveland Gas Burner & Appliance Co., 3702-3704 Superior Avenue, Cleveland, Ohio, announces a new and complete Sales Presentation Book, "More Gas," now ready for distribution. It contains the new Barber Catalog No. 30 illustrating and describing in detail the New and complete line of "Moderately Priced" Barber Conversion Gas Burners for all furnaces and boilers, also giving other valuable information and data; an attractive Sales Album which outlines and illustrates the procedure to follow in the Sale of Barber Conversion Gas Burners. "Telling how to tell the story to the prospect"; and other Sales literature, including an attractive eight-page stuffer size folder in three colors, three suggested newspaper "ads" of different sizes, for which mats will be supplied on request, and other pieces of sales literature of great value to everyone interested in gas heating either with conversion burners or other gas appliances. This complete Presentation Book will be sent promptly upon request.

M. J. Harper Made Manager

The Pittsburgh Equitable Meter Company announces that M. J. Harper has

M. J. Harper

succeeded Victor E. Arnold as manager of their New York City office. Mr. Harper is well fitted for this position through his experience in handling the Export Sales of the company for many years, as well as taking care of many important accounts in the New York territory.

George W. W. Cornman of Brown Instrument Co. Retires from Business

The Brown Instrument Company announces with regret that Mr. George W. W. Cornman, Treasurer and Manager of the Service Department of The Brown Instrument Company, retired from business, effective August 8, 1930.

Mr. Cornman has been associated with the instrument business for 35 years, formerly being Secretary and Treasurer of the Keystone Electical Instrument Company. When that organization was absorbed by The Brown Instrument Company, he became Treasurer and a Director of the present organization and was the active head of the Service Department, which was built up under his guidance.

The Service Department will be in charge of Mr. R. C. Kennan as Manager, and Mr. E. T. Nahill as Field Supervisor.

J. B. McMahon Now Located at the Foxboro Co.'s Home Office

Mr. J. B. McMahon, Tulsa branch manager of The Foxboro Company, will hereafter make his headquarters at the home office at Foxboro. He is to take charge of all field engineering service and will be responsible for all direct sales effort. Having a man of Mr. McMahon's experience in the field at the home office should be of distinct benefit to The Foxboro Company's many customers.

Mr. G. B. Lane, former manager of the Detroit office, has succeeded Mr. McMahon as branch manager at Tulsa. Mr. Lane is well equipped by experience and training to uphold the excellent reputation for service enjoyed by the Tulsa office.

Grossman Special Chicago Representative for Glamorgan Pipe

The Glamorgan Pipe & Foundry Company, Lynchburg, Va., announces the appointment of Mr. Frank Grossman as Special Representative with headquarters at 812 Peoples Gas Building, Chicago. Mr. Grossman has been connected with the Cast Iron Pipe Industry for many years, and is well known throughout the Central West.

R. D. O'Neil Appointed Engineering & Sales Representative for American Meter in Birmingham

R. D. O'Neil has been appointed as an Engineering and Sales Representative for American Meter Company, with headquarters at 8 South 13th Street, Birmingham, Alabama. He will specialize in servicing the sale of Westcott Orifice Meters, Linderman Orifice Meters, Metric Indicating Flow Meters and Rate Volume Controllers.

Mr. O'Neil has had extensive experience in the development, construction, specifying, application, testing and checking of plant, field and laboratory instruments.

Dangler Appointed Secretary of Cast Iron Pipe Research Assn.

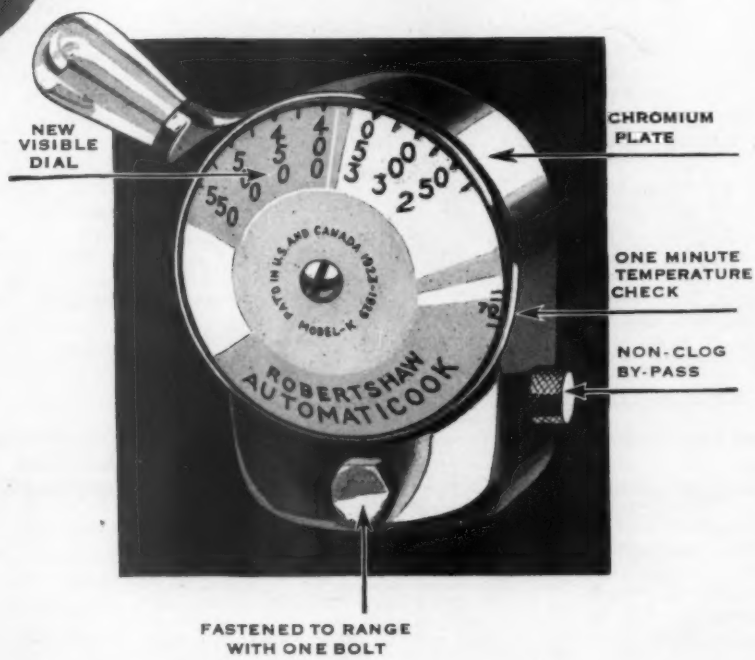
The Standardization and Development Committee of the Cast Iron Pipe Research Association has retained Mr. J. R. Dangler as Secretary, to look after all Standardization and Development work of the cast iron pipe industry.

Mr. Dangler was formerly Vice President and General Manager of the Massillon Iron and Steel Company and later Assistant to the President of the Central Steel Company of Massillon, Ohio. Mr. Dangler's office will be located at 923 Union Trust Building, Cleveland, Ohio.

(*Trade News continued on page 92*)

5 FEATURES!

make the "K" Type Robertshaw's greatest AutomatiCook



WHEN the new gas ranges reach you, look for the brand new, greatly improved Robertshaw "K" type AutomatiCook. Examine it. You'll find in the new AutomatiCook selling arguments that will make your ranges move faster.

Five new features—smaller, neater, more compact. There's a fully visible dial. There's a handsome chromium finish. There's a fool-proof One-Minute Temperature Check. A non-clog by-pass. And only *one* bolt holds the whole AutomatiCook to the range! Temperature setting, calibrating and all working parts accessible from outside the range.

We've prepared some descriptive literature of this new AutomatiCook. Write for it now. Study it before your ranges begin to arrive . . . . If you'll send us the names of your employees handling, selling or installing ranges, we'll be glad to send them literature to help sell ranges faster, too . . . Write—*today!*

ROBERTSHAW AutomatiCook

ROBERTSHAW THERMOSTAT COMPANY
Youngwood, Penna.

Surface Announces New House Heating Catalog

There is now available for mailing to gas companies the new JANITROL House Heating Catalog, listing the complete line of conversion burners manufactured by The Surface Combustion Company of Toledo, Ohio.

This attractive three color catalog contains useful information on house heating.

Copies may be secured by writing the manufacturer.

Robins Conveying Belt Co. to Handle Adams Coal Machinery Products

The Robins Conveying Belt Company has been granted by the Adams Coal Machinery Co. of Plainfield, N. J., the right to manufacture and sell the Adams Avalanche Chute, Adams Withdrawal Chute and Adams Floating Chute to the different industries and operations where bulk materials such as coal, coke, stone, sand and gravel are handled. This right is very broad in the case of producers of anthracite and bituminous coal and of dealers; practically exclusive in the case of coke producers and dealers; and entirely exclusive with any other bulk material.

Western Gas Issues Two New Bulletins

"Western Gas Butterfly Valves" is the title of Bulletin 300 recently edited by The Western Gas Construction Company, Fort Wayne, Indiana. This booklet gives a complete description of the Butterfly valves, which are used for regulating the flow of air, steam, gas, water, tar, etc. Diagram of the valve is shown and dimensions are given.

For the use of engineers who specify welded steel construction, information has been prepared on "D-2000 Welded Specifications." This bulletin is entitled "The Advantages of D-2000 Welded Construction. It describes three classes of welding which may be obtained under D-2000 specifications, and contains a number of illustrations.

Copies of these bulletins can be obtained from the Western Gas Construction Company, Fort Wayne, Ind.

W. J. McArt with Pittsburgh Equitable

Mr. McArt recently became a part of the Pittsburgh Equitable Meter organization working out of their Tulsa, Oklahoma office.

Mr. McArt graduated from Case School

W. J. McArt

of Applied Science, Cleveland, Ohio, in 1918 and became an inspection engineer for the Foote-Burt Company of that city. Later he went with the City Machine Company, of Cleveland, where he stayed until 1925, then to accept a position with the Cyclone Fence Company. He did special missionary work with State Highway engineers over the entire United States.

The training and field work done by Mr. McArt has been of a highly technical nature and he is particularly fitted for his work with the Pittsburgh Equitable Meter Company.

Roots Co. Issue New Blower Bulletins

The P. H. & F. M. Roots Company, Division of The Stacey Engineering Company, has issued two new four-page bulletins on low pressure and high pressure roller bearing blowers. Bulletin No. 22-B2 covers the low pressure blower, and bulletin No. 23-B2 covers the high pressure units.

Copies of these bulletins will be sent upon request to Roots or Connersville Blower Home Office at Connersville, or the Chicago Branch at 20 N. Wacker Drive, or the New York Branch at 420 Lexington Avenue.

Leeds & Northrup Issue 1930 Catalog

Leeds & Northrup Company, Philadelphia, Pa., recently issued the 1930 edition of Catalog No. 80 entitled "Resistance Thermometers." This is a revised edition of a previous issue and treats in detail of L & N Resistance Thermometers for recording, controlling and indicating temperatures. Considerable space is devoted to heating and ventilating applications, applications in refrigeration and chemical plants, in gas-making and other comparatively low temperature applications.

Precision equipment is listed, temperature difference equipment, thermometer indicators, Thermometer recorders and thermometer controllers with accessories. The bulletin is freely illustrated.

New Brown Instrument Bulletin Describes de Florez Remote Manual Control System

Bulletin No. 7520 recently published by the Brown Instrument Company, Philadelphia, Pa., describes and discusses the de Florez System of Remote Control. Operating through an application of Selsyn Motors, the de Florez System of Remote Manual Control is claimed to be extremely flexible and sensitive. The bulletin contains schematic diagrams showing operating principle of the System, as well as other illustrations.

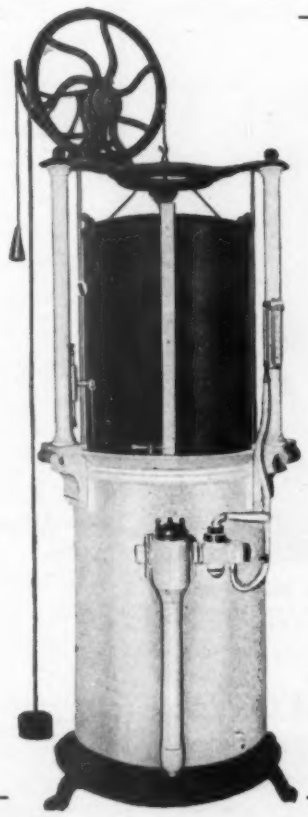
Copies of this bulletin will be forwarded upon request by the Brown Instrument Company.

BESSE, OSBORN & ODELL INC. · COLONIAL BRAND · BOSTON, U.S.A. · RE-CHROME METER LEATHER

"COLONIAL" BRAND
RE-CHROME and OILED METER LEATHERS
Insure Longer Service and Less Repairs
The Most Satisfactory Leathers to Use for Diaphragms in New Meters and Repair Work
← *This Trade Mark stamped on each New Zealand Lambskin is our guarantee to you that each skin has received the greatest care in its selection and tanning.*
BESSE, OSBORN & ODELL, Inc., 51 South St., Boston, Mass.
W. A. Smith—G. Norman Bankart, Representatives 177 William St., New York

SUPERIOR

Gas Meters
Provers
Service Cleaners
Diaphragms
Repairs



SUPERIOR METER CO.
167-41st Street
Brooklyn, N. Y.

BAROMETERS

PHILADELPHIA, THE WORKSHOP OF THE WORLD
has 14,000 Manufacturing Establishments of which many have World-Wide Reputations.

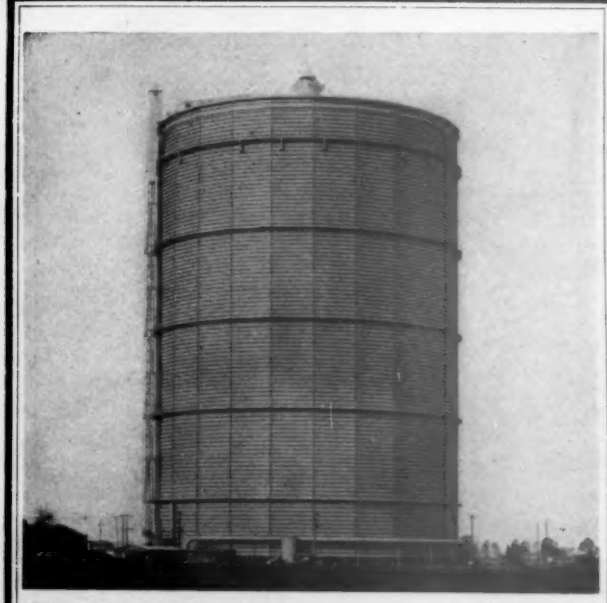
"PRINCO" STANDARD FORTIN MERCURIAL BAROMETERS

are in World-Wide use because they, too, have a "World-Wide Reputation"

THEY ARE GOOD BAROMETERS
THEY ARE REASONABLE IN PRICE!

For more than a decade they have been made in such manner that they can be shipped safely and successfully wherever there is a common carrier. This has been recognized as an achievement in Barometry.

PRECISION THERMOMETER & INSTRUMENT COMPANY
1439 BRANDYWINE STREET - - - - - - PHILADELPHIA, PA.



This 10,000,000 cubic foot water-less holder in the Middle West is one of hundreds protected and beautified by CE-CO Holder Paints.

From Base to Crown CE-CO HOLDER PAINTS PROTECT

There's a CE-CO tested and tried Technical Paint that preserves every part of the gas holder from the base to the crown.

CE-CO Technical Paints protect the investment in these costly holders and reduce this one item of plant maintenance and overhead to the minimum.

The formulae of the various CE-CO Paints for holders and other structural metal work in different parts of the gas plant, are predicated upon the knowledge and experience of over half a century combatting corrosion and severe fume conditions.

The successes achieved by the various CE-CO Technical Paints are based on knowing what paint will produce the best and most lasting results when applied to those structures for which they were formulated and for which, from our long experience as *technical* paint makers, we are ably qualified to recommend.

Send for Bulletins and color cards

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Cheesman-Elliot Company, Inc.

Established 1876

TECHNICAL PAINT MAKERS

639-647 Kent Avenue - Brooklyn, N. Y.

Works at Brooklyn, N. Y. and Williamsport, Pa.

TRADE CATALOGS

Published by manufacturers of Gas Equipment and Appliances for you. Order by number, using coupon on Page 103.

PLANT EQUIPMENT

A. B. C. SELF CLINKERING GENERATOR
The Western Gas Construction Co. 88

ADVANTAGES OF WELDED CONSTRUCTION
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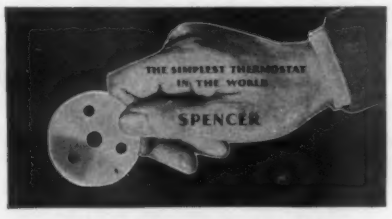
SAFETY PILOT KLIXON FOR CIRCULATING TANK HEATERS

KLIXON Safety Pilots are simple and dependable because they have exclusive use of the famous Spencer thermostatic disc. This disc (shown below) is the simplest thermostat in the world,—hence the most dependable. It is a bi-metallic concave segment that snaps into a convex position at an accurately determined point in the temperature range. As applied to this Klixon Safety Pilot it closes the main gas valve if the pilot light is extinguished for any reason. It generates its own power, and needs no cams, toggles, or other mechanical advantages. The disc and the valve form the only moving unit in the complete safety pilot. It cannot get out of order.



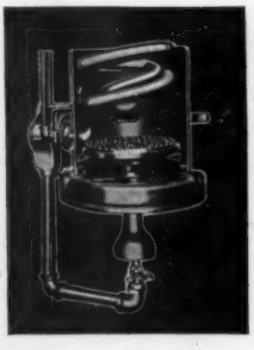
A complete thermostat, generating its own power to give its powerful action

The Klixon Safety Pilot can be put on existing installations easily and quickly. It is made in one style and size for all heaters.

Here are six outstanding features that put this safety pilot in a class by itself:—

1. Absolutely reliable (will act as accurately years from now as when first installed).
2. Valve is self-seating, and powerful "click" of the "disc" eliminates valve cleaning.
3. Compact, simple and fool-proof (there is nothing to adjust or need servicing).
4. A positive snap-action without toggles, cams, or springs. No buttons to push or levers to pull.
5. Made in one size and style for any tank heater. (Can be put on by anyone).
6. Simply light it and forget it. It automatically comes on and goes off with a "click" in case of pilot outage.

The Klixon Safety Pilot is simple, compact, and fool-proof



Made in one size and one style only for any tank heater

The Klixon is made according to rigid specifications, it is reasonably priced, and is backed by a reliable company. It has been thoroughly tested in thousands of installations made by leading gas companies. It meets all requirements for safety. Gas companies and plumbing contractors are opening up a tremendous new market for their services. This much-needed safety device is not only providing profitable business but it is making the use of gas much safer.

May we send you a sample of the famous Spencer disc that has made possible this great safety device? We shall be glad to send one, with prices and any additional information at your request.

SPENCER THERMOSTAT CO

CAMBRIDGE · · · MASS

ABSOLUTELY

no delays in traffic when you use the

ARMCO Jacking Method

A combination conduit for water lines and storm water carrier . . . Armco Corrugated Iron Pipe installed by the Armco Packing Method under railway tracks at Winston-Salem, N. C.

GREAT are the savings in time to rail or vehicular traffic when pipe for conduits or drainage is installed by the Armco Jacking Method, an Armco development. Never a moment of delay . . . because the entire job goes on beneath the road.

This modern way, employed by many gas, public utility and other companies coast to coast, also saves considerable on installation costs. Compared to slow, costly open trenching, the Armco Jacking Method saves as much as 30 to 50 per cent. In addition there is no injury to adjoining structures because there is no backfill to shrink or settle.

Ease of hauling to the job and installing Armco Corrugated Iron Pipe by the Armco Jacking Method, plus the exceptional durability of this Nature-tested pure iron product, make this product and method the ideal economic combination to employ. Armco Corrugated Iron Pipe alone holds the record for length of service in the ground—24 years, under every condition of soil, water and pressure. Data assembled from the nation-wide studies and field investigations of Armco engineers will be sent on request. Write.

Armco culverts and drains are manufactured from the Armco Ingot Iron of The American Rolling Mill Company and always bear its brand.

ARMCO CULVERT MANUFACTURERS ASS'N.
Middletown, Ohio

C, 1930, A.C.M.A.

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Style 900 Braided Jute
Southwestern Ring
Cement or Calking Lead

Joints As Permanent As Cast Iron Pipe

For New Mains or Repairing Old Joints

WRITE FOR SAMPLE MATERIALS

Southwestern Pipe Joint & Engineering Co.

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Factory Shipments From Passaic, N. J.

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Radiant "Coalfires"
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SEAMLESS TUBING

Lengths and Coils
Quick Delivery from Stock
We Want to Quote Where Quality Counts

WOLVERINE TUBE CO.

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ISBELL-PORTER COMPANY

Engineers and Contractors for Complete Gas Works

I-P C

Manufacturers of All Kinds of Gas Apparatus

NEWARK - NEW JERSEY

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The Western Gas Construction Company.
United Engineers & Constructors, Inc.

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Oxweld Acetylene Co.

ACETYLENE EQUIPMENT
American Lava Corp.

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Cruse-Kemper Co.
The Gas Machinery Co.
Isbell-Porter Company.
Semet-Solvay Engineering Corp.
The Stacey Mfg. Co.
John S. Unger.
The Western Gas Construction Company.

AMMONIA CONCENTRATED LIQUOR PLANTS
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Semet-Solvay Engineering Corp.

AMMONIA PIPE
National Tube Company.

AMMONIA RECOVERY APPARATUS
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Semet-Solvay Engineering Corp.
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AMMONIA STILLS
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Cruse-Kemper Co
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Semet-Solvay Engineering Corp.
The Stacey Mfg. Co.
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The Western Gas Construction Company.

AMMONIA TEST
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McClintoc-Marshall Co.
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AUDITS
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United Engineers & Constructors, Inc.
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General Refractories Co.
Improved Equipment Co.-Russell Eng. Corp.
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CALCIUM CARBIDE
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FULTON

BACK PRESSURE REGULATORS

are made to stop the flow of gas in a pipe line when the pressure falls to a point lower than is considered advisable.

Like all Chaplin-Fulton equipment they can be depended upon for accurate and reliable service. Forty-five years of successful experience in the manufacture of gas and steam regulators make us confident we can serve you to advantage.

Write for catalogue.

CF

The Chaplin-Fulton Mfg. Co.

28-40 Penn Ave. Pittsburgh, Pa.

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DISCHARGING MACHINERY
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DUPLEX HEATING SYSTEMS
Roberts-Gordon Appliance Corpn.

ELECTRIC LOCOMOTIVES
C. W. Hunt Co., Inc.

ELEVATORS
C. W. Hunt Co., Inc.

ENGINEERS
American Meter Co.
The Gas Machinery Co
Southwestern Pipe Joint & Eng. Co.
Combustion
Bartlett-Hayward Co.
The C. M. Kemp Mfg. Co.
Smoot Engineering Corp.
United Engineers & Constructors, Inc.
Consulting
Bartlett-Hayward Co.
Edw. A. Dieterle
United Engineers & Constructors, Inc.
The Western Gas Construction Company.
Contracting
Bartlett-Hayward Co.
Cruse-Kemper Co.
Gas Engineering Company.
C. W. Hunt Co., Inc.
Improved Equipment
Russell Engineering Corpn.
Isbell-Porter Company
McClintoc Marshall Co.
Stacey Gros. Gas Const. Co.
United Engineers & Constructors, Inc.
West Gas Improvement Co.
The Western Gas Construction Company.
Distribution
United Engineers & Constructors, Inc.
Measurement
American Meter Co.
Connersville Blower Co.

EXHAUSTERS
Connersville Blower Co., The
The Gas Machinery Co.
Isbell-Porter Company.
The P. H. & F. M. Roots Company.
The Western Gas Construction Company

EXPANSION BENDS
The Gas Machinery Co.
Semet-Solvay Engineering Corp.

FILTERS, Gas
American Meter Co.

FIREBRICK CEMENT
General Refractories Co.
Quigley Furnace Specialties Co., Inc.
Refractory & Engineering Corp.

FIREBRICK CHECKER BRICK
(See Brick)
The Gas Machinery Co.
General Refractories Co.
Improved Equipment-Russell Engineering Corp.
United Engineers & Constructors, Inc.
The Western Gas Construction Company.

FIRST AID EQUIPMENT
United Engineers & Constructors, Inc.

FITTINGS
S R Dresser Mfg. Co.
Isbell-Porter Company.
Semet-Solvay Engineering Corp.
The Stacey Mfg. Co.
U. S. Cast Iron Pipe and Foundry Co.
The Western Gas Construction Company.
Plain End and Flanged
Cast Iron Pipe Research Association.

FIXTURES
American Lava Corp.

FLOORS, IRON, BRICK, AND STEEL
The Gas Machinery Co.
McClintoc Marshall Co.
Semet-Solvay Engineering Corp.
United Engineers & Constructors, Inc.
The Western Gas Construction Company.

FLOW METERS
American Meter Co.
Brown Instrument Co., The
Lambert Meter Co.

FLUE PIPE (Cast Iron Oval)
Semet-Solvay Engineering Corp.

FURNACES
Gas Fired
Geo. D. Roper Corp.
Gas Soldering
American Meter Co.

GAS ANALYSIS APPARATUS
American Meter Co.
Metric Metal Works.

GASKETS
American Meter Co.
Pittsburgh Equitable Meter Co.
Reynold Gas Regulator Co.
Superior Meter Co.

GAS COAL
Boone County Coal Corpn.

GAS MAIN CONDUITS
Armco Culvert Manufacturers Assn.

GASOMETERS (Test)
American Meter Co.

GAS PLANTS, COMPLETE
Gas Engineering Co.
Improved Equipment-Russell Engineering Corpn.
Isbell-Porter Company.
Philfuels Co.
United Engineers & Constructors, Inc.
West Gas Improvement Co.
The Western Gas Construction Co.

GAS SCREEN
Connelly Iron Sponge & Governor Co.

GASSING MACHINE
American Meter Co.
Lambert Meter Co.
Superior Meter Co.

GAS TAPE
Connelly Iron Sponge & Governor Co.

GAS TESTING APPARATUS
American Meter Co.
Metric Metal Works.

GATE VALVES (See Valves)

GATES—WIND & BLAST
The P. H. & F. M. Roots Company.
The Western Gas Construction Co.

GAUGE BOARDS
The Bristol Company.
Brown Instrument Co., The
Connelly Iron Sponge & Governor Co.
The Gas Machinery Co.
Lambert Meter Co.
United Engineers & Constructors, Inc.
The Western Gas Construction Company.

GAUGES
American Meter Co.
The Bristol Company.
Brown Instrument Co., The
Connelly Iron Sponge & Governor Co.
The Gas Machinery Co.
Lambert Meter Co.
Pittsburgh Equitable Meter Co.
The P. H. & F. M. Roots Company.
Superior Meter Co.
The Western Gas Construction Company.
Mercury
Precision Thermometer & Instrument Company.
Pressure-Recording
American Meter Co.
Brown Instrument Co.
Precision Thermometer & Instrument Company.
Siphon
Precision Thermometer & Instrument Company.
Tank
Brown Instrument Co.
Precision Thermometer & Instrument Company.
Water
Precision Thermometer & Instrument Company.

ACETYLENE, WELDING
Oxweld Acetylene Co.

GLOVES
Rubber
Safety Gas Main Stopper Co.

GOVERNORS
Pittsburgh Equitable Meter Co.
Automatic
The Chaplin Fulton Mfg. Co.
Connelly Iron Sponge & Governor Co.
Groble Gas Regulator Co.
Reynolds Gas Regulator Co.
Smoot Engineering Corp.
The Sprague Meter Co.

GOVERNORS (Calorimeter and Double Dry)
American Meter Co.
Reynolds Gas Regulator Co.
Coke Oven
The Chaplin Fulton Mfg. Co.
Connelly Iron Sponge & Governor Co.
The Gas Machinery Co.
Reynolds Gas Regulator Co.
Smoot Engineering Corp.
District
The Chaplin Fulton Mfg. Co.
Connelly Iron Sponge & Governor Co.
Groble Gas Regulator Co.
Isbell-Porter Co.
Smoot Engineering Corp.
Exhauster
Connelly Iron Sponge & Governor Co.
Connersville Blower Co., The
The Gas Machinery Co.
Isbell-Porter Co.
The P. H. & F. M. Roots Company.
Smoot Engineering Corp.
High Pressure
The Chaplin Fulton Mfg. Co.
Connelly Iron Sponge & Governor Co.
Groble Gas Regulator Co.
Reynolds Gas Regulator Co.
Smoot Engineering Corp.
The Sprague Meter Co.
Laboratory
American Meter Co.
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Lambert Meter Co.
D. McDonald & Co.
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Low Pressure
The Chaplin Fulton Mfg. Co.
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Smoot Engineering Corp.
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Retort House
Isbell-Porter Company.
Station

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Semet-Solvay Engineering Corp
The Western Gas Construction Co.

GRAVITOMETERS
Precision Thermometer & Instrument Company.

GRIDS, for Scrubbers
Semet-Solvay Engineering Corp.
The Western Gas Construction Co.

GUN-REFRACTORY
Quigley Furnace Specialties Co.

HEATERS
Feed Water
Andale Company.
For Oil
Andale Co.
American Gas Products Corp.
American Stove Company.
Homestead Heater Company.
Kompak Company.
Roberts-Gordon Appliance Corpn.
Welsbach Company.

HIGH CAPACITY METERS
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HOISTS
The Gas Machinery Co.
C. W. Hunt Co., Inc.
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HOLDERS
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Cruse-Kemper Co.
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C. W. Hunt Co., Inc.
McClintoc Marshall Co.
The Stacey Mfg. Co.
The Western Gas Construction Co.

HIGH PRESSURE STORAGE
Cruse Kemper Co.
Stacey Bros. Gas Construction Co.
Stacey Mfg. Co.

HOWARD AUTOMATIC CHARGERS
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Bartlett-Hayward Co.
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Gas Engineering Co.
Improved Equipment-Russell Engineering Corp.
Semet-Solvay Engineering Corp.
The Stacey Mfg. Co.
United Engineers & Constructors, Inc.
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Roberts-Gordon Appliance Co.
Smoot Engineering Corp.

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IRON BORING OXIDE
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IRON SPONGE
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The Bristol Company.
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Metric Metal Works.
Precision Thermometer & Instrument Company.

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Refractory & Engineering Corpn

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Philfuels Co.

PROPANE
Philfuels Co.

JOINTS (Pipe)
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Two Pipes of Peace!

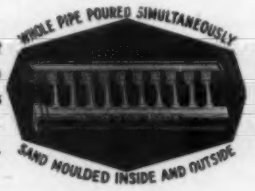
To have peace in his mind, a gas distribution man needs cast iron pipe in his mains. Then the old cob pipe hits on all six: he knows rust cannot harm his gas pipe this year, next year, —or next century. Cast Iron *lasts*.

McWane cast iron pipe—with B. & S., threaded, or Flexpan joints—holds the gas. The latter two are recommended for pressures to 100 pounds.

Get This New Booklet

New small cast iron pipe booklet and Flexpan folder now ready. At least find out how cast iron can help in its new forms and strengths.

McWane cast iron pipe can be had as small as 1¼ and 2 inches.



Avoid future trouble with rust by specifying all lines above 1 inch cast iron.

WRITE FOR ILLUSTRATED LITERATURE

McWANE CAST IRON PIPE

McWANE CAST IRON PIPE COMPANY
BIRMINGHAM, ALA.

PACIFIC STATES CAST IRON PIPE COMPANY
PROVO, UTAH

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LIQUEFIED PETROLEUM GASES
Philfuels Co.
LUGS—SOLDERING
Wolverine Tube Company.
LUX MATERIAL
Alpha-Lux Company.
LUX SPONGE
Alpha-Lux Company.
MANILA AND WIRE ROPE
C. W. Hunt Co., Inc.
MANOMETERS
American Meter Co.
Brown Instrument Co., The
Precision Thermometer & Instrument Company.
MANTLES
Welsbach Company.
MASKS—GAS
Safety Gas Main Stopper Co.
MAST & GAFF OUTFITS
C. W. Hunt Co., Inc.
MEASURING CHUTES
C. W. Hunt Co., Inc.
MECHANICAL GENERATORS for Water Gas App.
United Engineers & Constructors, Inc.
The Western Gas Construction Co.
METER CONNECTIONS
American Meter Co.
Bartlett-Hayward Co.
S. R. Dresser Mfg. Co.
Lambert Meter Co.
Pittsburgh Equitable Meter Co.
Superior Meter Co.
METER REPAIRING
American Meter Co.
Lambert Meter Co.
Superior Meter Co.
METER TESTER, Hydro-Pneumatic
American Meter Co.
METERS
American Meter Co.
Brown Instrument Co., The
Pittsburgh Equitable Meter Co.
Air
Brown Instrument Co.
Connersville Blower Co., The
The Gas Machinery Co.
Lambert Meter Co.
The P. H. & F. M. Roots Company.
The Sprague Meter Co.
Superior Meter Co.
United Engineers & Constructors, Inc.
The Western Gas Construction Company.
Artificial
American Meter Co.
Connersville Blower Co., The
Lambert Meter Co.
The P. H. & F. M. Roots Company
The Sprague Meter Co.
Superior Meter Co.
Demand
American Meter Co.
Brown Instrument Co.
Connersville Blower Co., The
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Superior Meter Co.
Demonstration
District
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Dry
American Meter Co.
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The P. H. & F. M. Roots Company.
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High Pressure
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Prepayment
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Proportional
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Rotary Displacement
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Brown Instrument Co.
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Steam
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Test
American Meter Co.
The Sprague Meter Co.
Superior Meter Co.
Wet Test
American Meter Co.
METER LEATHER
American Meter Co.
Besse, Osborn and Odell, Inc.
MILLER GRIP PACKING
Connelly Iron Sponge & Governor Co.
MIXERS, GAS
Robert-Gordon Appliance Corpn.
Semet-Solvay Engineering Corp.
Smoot Engineering Corp.
MOISTURE DETERMINATORS
United Engineers & Constructors Inc.
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MOTOR CARS
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NAPHTHALENE EXTRACTORS
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The Gas Machinery Co
Semet-Solvay Engineering Corp.
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OIL HEATERS
Andale Co.
ORE, CHROME
E. J. Lavino & Co.
General Refractories Co.
Quigley Furnace Specialties Co.
ORIFICE METERS
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OVENS (BAKERS)
The Bruce McDonald Co.
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OVENS, COKE AND GAS
Improved Equipment
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The Gas Machinery Co
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The Stacey Mfg. Co.
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OXIDE
Alpha-Lux Company.
Connelly Iron Sponge & Governor Co.
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OXYGEN
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OXYGEN AND HYDROGEN METERS
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Quigley Furnace Specialties Co.
The Stacey Mfg. Co.
Wailes Dove-Hermiston Corp.
Metal Protective
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PAINTS, ANTI ACID AND ALKALI
Cheesman-Elliott Co.
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PAINTS, RUSTPROOF
Cheesman-Elliott Co.
Inertol Co., Inc.
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PILOTS-SAFETY
Spencer Thermostat Co.
PIPE
Waylow Pipe Co.
Hedges-Walsh-Weidner Co.
National Tube Co
The Stacey Mfg. Co.
United States Pipe & Foundry Co.
The Western Gas Construction Co.
Bell
American Meter Co.
Semet-Solvay Engineering Corp.
McWane Cast Iron Pipe Co.
Bell and Spigot
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Cast Iron
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Flange
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National Tube Co.
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Semet-Solvay Engineering Corp.
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The Koppers Construction Co.
Philfuels Co.
Stacey Bros. Gas Const. Co.
The Stacey Mfg. Co.
United Engineers & Constructors, Inc.
West Gas Improvement Co.
The Western Gas Construction Company
PLATES
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Floor
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Safety Gas Main Stopper Co.
Soft Wood
Safety Gas Main Stopper Co.
PORTABLE TEST METERS
American Meter Co.
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PRODUCER GAS PLANT
Gas Engineering Co.
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Hand
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The P. H. & F. M. Roots Company.
Power
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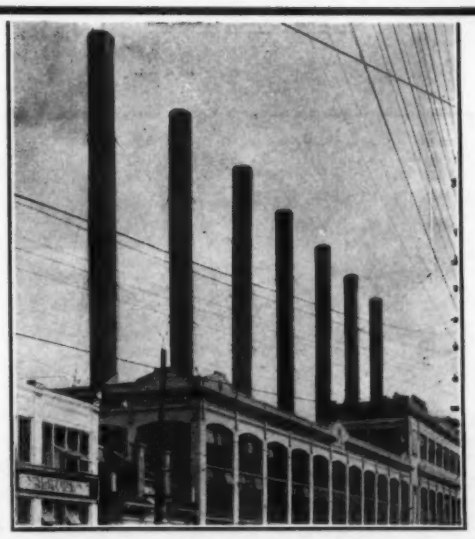

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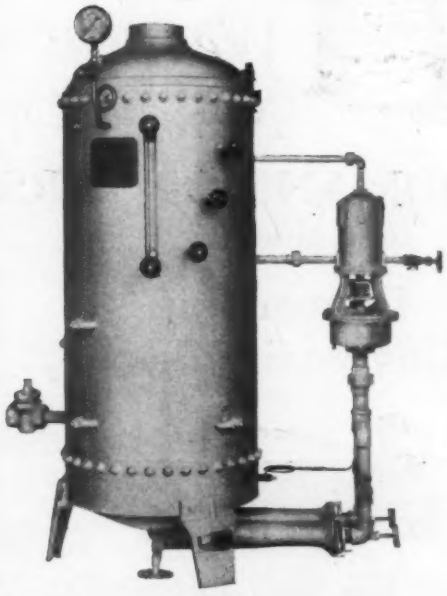

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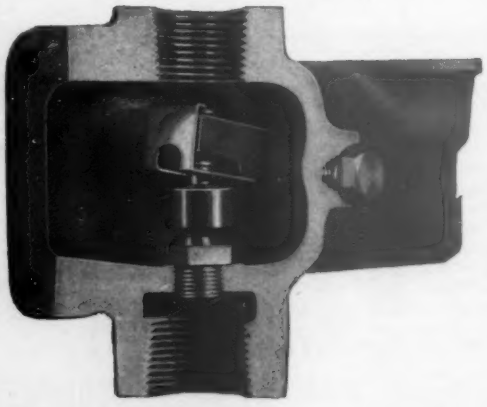

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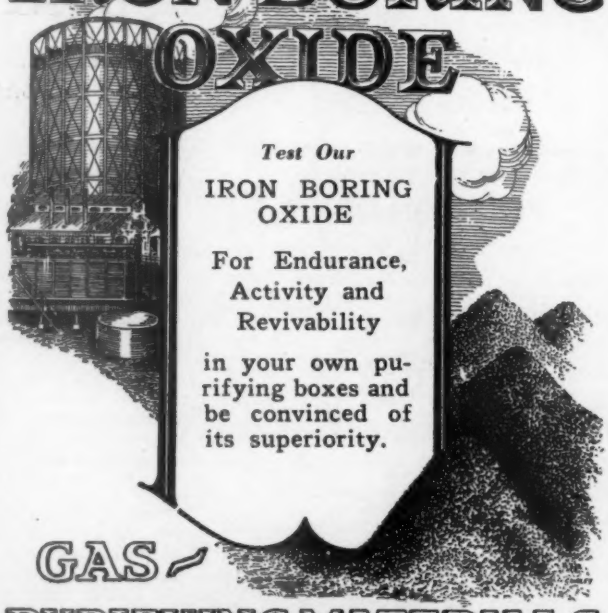

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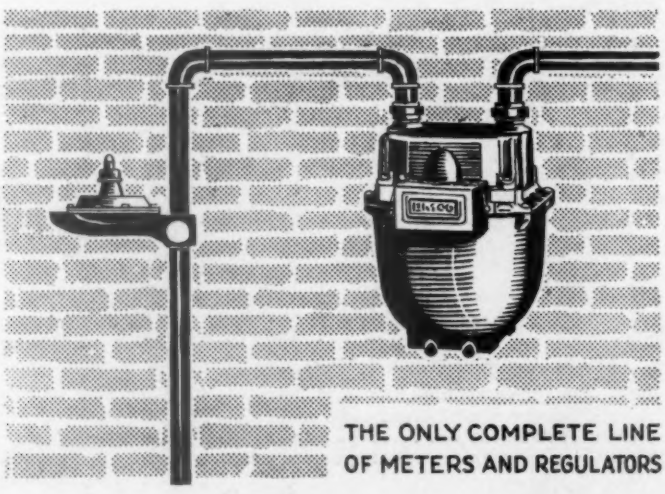

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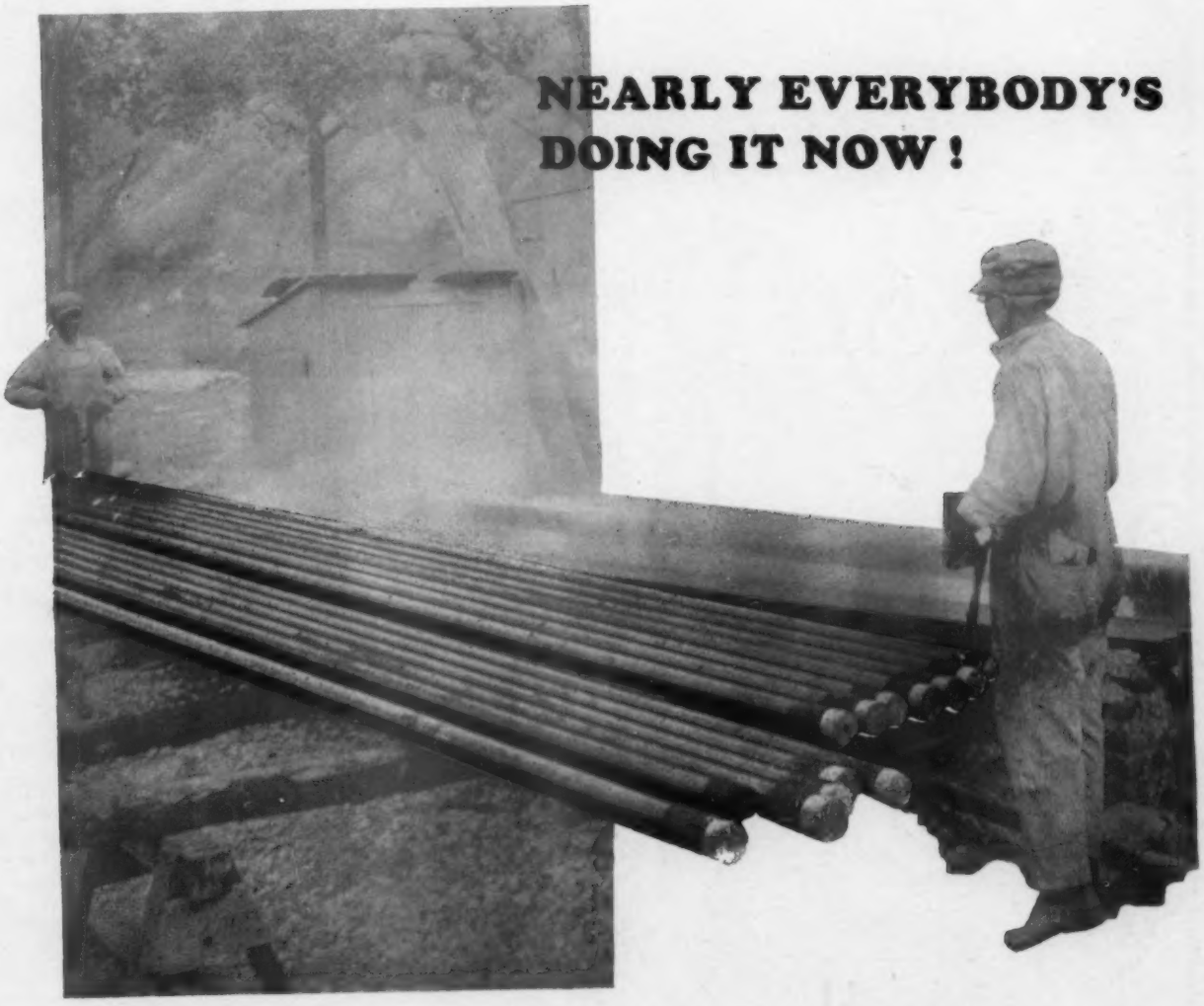

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